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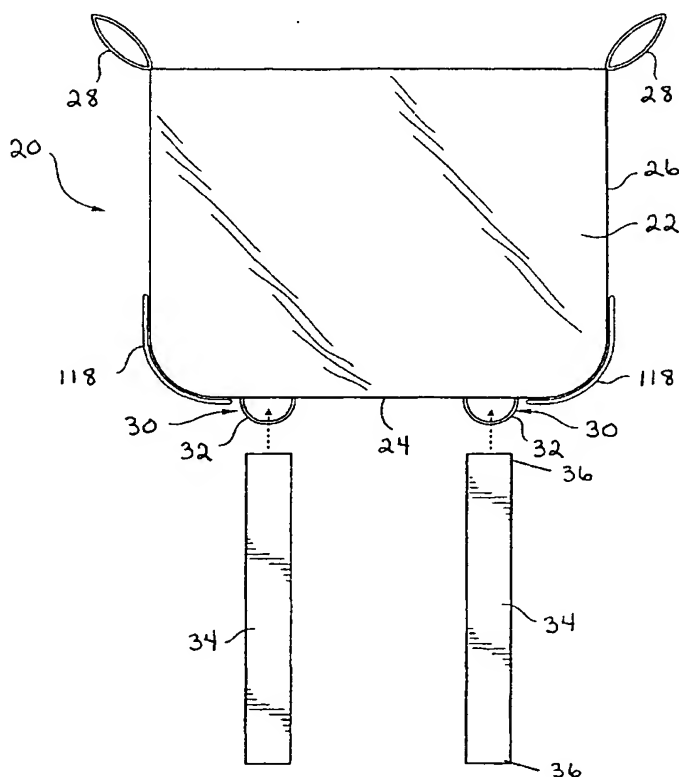
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- (21) International Application Number: **PCT/CA01/01640**
- (22) International Filing Date: 22 November 2001 (22.11.2001) (72) Inventors; and (75) Inventors/Applicants (*for US only*): **BAKER, Gerald, Lynn** [CA/CA]; Box 79123, 70, 1020 Sherwood Drive, Sherwood Park, Alberta T8A 2G4 (CA). **HUTTON, Dennis, Duff** [CA/CA]; 6407-36 Avenue, Edmonton, Alberta T6L 1E9 (CA).
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(54) Title: **BULK BAG**



(57) Abstract: A bulk bag of the type comprising a flexible body having a bottom and a sidewall. The bulk bag is comprised of at least one pair of tubular fork tine receiving members associated with the body and arranged in a substantially parallel spaced relationship for receiving fork tines from a forklift. Each fork tine receiving member includes a flexible sleeve and a removable rigidifying insert positioned therein to facilitate the receipt of the fork tines in the receiving members. Further, the bulk bag is comprised of a releasable restrainer for inhibiting the removal of the rigidifying insert from the sleeve, wherein the releasable restrainer is associated with at least one of the pair of fork tine receiving members.

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BULK BAGFIELD OF THE INVENTION

5 The present invention relates to a bulk bag.

BACKGROUND OF THE INVENTION

10 Bulk bags are large bags that are used to transport bulk commodities. They are currently transported on low portable platforms known as "pallets." The use of pallets facilitates the handling of bulk bags with fork lifts. However, pallets increase the weight and, consequently, the cost of shipping bulk bags. This involves both the transportation of full bulk bags and pallets from the shipper to the customer, and the transportation of empty bulk bags and pallets from the customer back to the shipper.

15 As a result, various approaches have been taken to provide a bulk bag that can be readily lifted by a fork lift and transported without requiring the use of a separate pallet structure. However, none of these approaches have been found to be fully satisfactory.

20 For instance, U.S. Patent No. 3,425,472 issued February 4, 1969 to Marino is directed a bulk cargo container including a rigid base portion to thereby palletize the container. More particularly, the cargo container comprises a rigid base portion which is formed of molded plastic, wood, metal or the like and takes the form of a pallet. Specifically, the rigid base portion comprises a bottom wall portion with laterally spaced leg portions
25 extending downwardly therefrom to raise the bottom wall portion above a supporting surface and to allow the cargo container to be lifted and transported by a fork lift. Thus, Marino provides for a container having a solid pallet structure permanently affixed or mounted to the bottom thereof. Accordingly, Marino has similar disadvantages to those associated with the use of a pallet with the bulk bag as discussed above.

30 Similarly, German Patent Application No. DE 28 24 929 A1 published December 20, 1979 by Gebrüder Friedrich describes the connection of a pallet or pallet structure to the bottom of a bulk bag. More particularly, the pallet is comprised of a pair of solid beams having two cross braces extending between the beams. The beams are received

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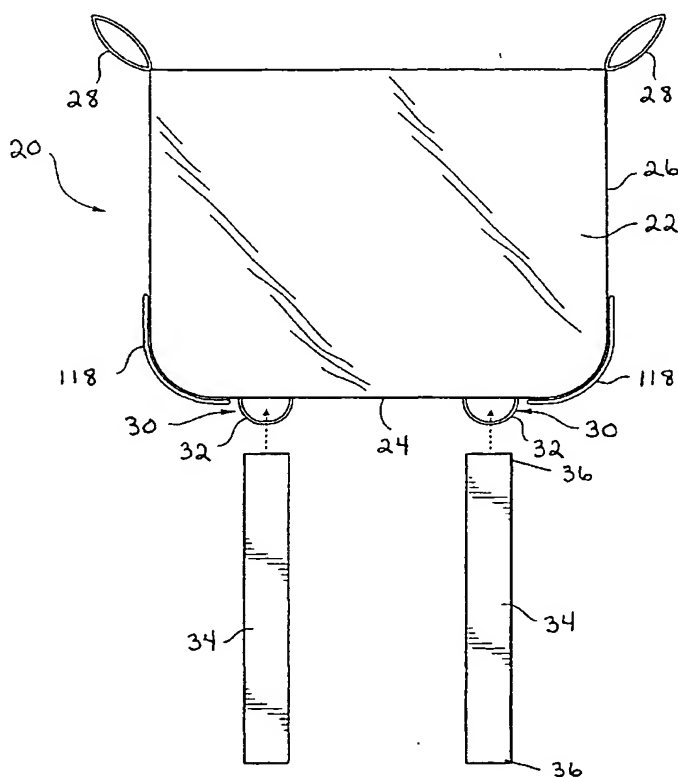
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(54) Title: BULK BAG



(57) Abstract: A bulk bag of the type comprising a flexible body having a bottom and a sidewall. The bulk bag is comprised of at least one pair of tubular fork tine receiving members associated with the body and arranged in a substantially parallel spaced relationship for receiving fork tines from a forklift. Each fork tine receiving member includes a flexible sleeve and a removable rigidifying insert positioned therein to facilitate the receipt of the fork tines in the receiving members. Further, the bulk bag is comprised of a releasable restrainer for inhibiting the removal of the rigidifying insert from the sleeve, wherein the releasable restrainer is associated with at least one of the pair of fork tine receiving members.

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making the fork tine receiving members in the form of flexible sleeves associated with the body of the bulk bag into which are inserted rigidifying inserts to facilitate the receipt of the fork tines in the receiving members.

5 Although beneficial results may be obtained through the use of the bulk bag, as described above, the rigidifying inserts may limit the extent to which empty bulk bags may be folded up for transport. Therefore, the rigidifying inserts are preferably removable from the sleeves to facilitate transportation of empty bulk bags.

10 There are various methods, mechanisms, structures and devices for maintaining the rigidifying inserts within the sleeves and yet, still permit the removal or withdrawal of the rigidifying inserts to facilitate the transportation of empty bulk bags. Preferably, a releasable restrainer associated with the fork tine receiving member is provided for inhibiting the removal of the rigidifying insert from the sleeve.

15 In one aspect of the invention, the invention is comprised of a bulk bag of the type comprising a flexible body having a bottom and a sidewall, the bulk bag comprising:

- 20 (a) at least one pair of tubular fork tine receiving members associated with the body and arranged in a substantially parallel spaced relationship for receiving fork tines from a forklift, wherein each fork tine receiving member is comprised of a flexible sleeve and a removable rigidifying insert positioned therein to facilitate the receipt of the fork tines in the receiving members;
- 25 (b) a releasable restrainer for inhibiting the removal of the rigidifying insert from the sleeve, wherein the releasable restrainer is associated with at least one of the pair of fork tine receiving members.

30 The pair of fork tine receiving members may be associated with any part or portion of the body of the bulk bag compatible with receiving the fork tines of the fork lift therein. In other words, the fork tine receiving members may be positioned at any location accessible by, and suitable for receiving, the fork tines. For instance, the fork tine receiving members may be associated with the sidewall of the body. However, preferably, the fork tine receiving members are associated with the bottom of the body of the bulk bag.

Further, the bulk bag includes at least one pair of fork tine receiving members for receiving the fork tines of the fork lift. However, to facilitate the use of the bulk bag, where desired, the bulk bag may be comprised of two pairs of tubular fork tine receiving members, wherein a first pair of tubular fork tine receiving members intersects substantially perpendicularly a second pair of tubular fork tine receiving members.

As indicated, each tubular fork tine receiving member is comprised of a flexible sleeve and a removable rigidifying insert positioned therein to facilitate the receipt of the fork tine in the receiving member. Thus, the sleeve and the rigidifying insert are selected to be compatible such that the insert is receivable within the sleeve and the fork tine is receivable within the rigidifying insert. Thus, the size, shape and configuration of the sleeve are adapted for the insertion of the rigidifying insert, while the size, shape and configuration of the rigidifying insert are adapted for the receipt of the fork tine therein.

The flexible sleeve, or a portion thereof, may be comprised of the body of the bulk bag. In other words, the flexible material comprising the body of the bulk bag may form part or all of the flexible sleeve. For instance, the sleeve of each fork tine receiving member may be comprised of the bottom of the body of the bulk bag. Thus, the flexible bottom of the body of the bulk bag forms part or all of the flexible sleeve.

Where the complete or entire flexible sleeve is comprised of the bottom of the bulk bag, the flexible sleeve may be integrally formed with the bottom, such as by forming a fold in a portion of the bottom of the bulk bag to provide the sleeve or by integrally manufacturing the sleeve into the material comprising the bottom of the bulk bag. Where a portion or section of the flexible sleeve is comprised of the bottom of the bulk bag, the flexible sleeve may be formed by affixing, fastening or attaching, in any suitable manner, a separate or distinct piece of flexible material with the bottom to provide the sleeve. Alternately, the flexible sleeve may be completely distinct or separate from the bottom of the bulk bag. For instance, the flexible sleeve may be formed or manufactured from a separate or distinct piece or strip of a flexible material apart from the bottom of the bulk bag and then affixed, fastened or otherwise attached with the bottom of the bulk bag.

Further, the flexible sleeves may be positioned relative to the body of the bulk bag such that the flexible sleeves are located interiorly or exteriorly of the body of the bulk bag. Preferably, the flexible sleeves are located exteriorly of the body of the bulk bag. Further, the flexible sleeves are preferably particularly located exteriorly of the bottom of the body of the bulk bag. In the preferred embodiment, the sleeve of each fork tine receiving member depends from the bottom of the body of the bulk bag.

The sleeve may be comprised of any flexible material permitting the receipt and removal of the rigidifying insert therein. For instance, the sleeve may be comprised of a material with sufficient elasticity to stretch to receive the rigidifying insert and then contract to inhibit the rigidifying insert from being removed from the sleeve. In this case, the sleeve is preferably comprised of a flex plastic. Further, the flex plastic is preferably comprised of ethylene vinyl acetate and may be either a woven material or provided in a sheet form. Where the sleeve is comprised of an elastic material, the releasable restrainer may be comprised of the sleeve itself which stretches to receive the rigidifying insert and contracts to inhibit the removal of the rigidifying insert. However, preferably, the elastic sleeve enhances the action or functioning of the releasable restrainer by further inhibiting the removal of the rigidifying insert from the sleeve.

In order to facilitate the insertion of the fork tine therein, at least one and preferably each of the rigidifying inserts is comprised of a tubular member. The tubular member is preferably an elongate, hollow member having a shape, size and configuration suitable for the receipt of the fork tine therein. The tubular member may have any shape or configuration on cross-section which is receivable within the flexible sleeve and which permits the insertion of the fork tine. For instance, the tubular member may be cylindrical having a circular or semi-circular cross-section. Alternately, the tubular member may be comprised of a channel-form member having a three-sided configuration of a square or a rectangle on cross-section. Preferably, the tubular member has a four-sided configuration of a square or a rectangle on cross-section.

In addition, each sleeve has opposed ends defining a sleeve length therebetween. Similarly, the rigidifying insert has opposed ends defining an insert length therebetween. The sleeve length and the insert length may be selected such that the rigidifying insert is contained within the sleeve or such that one or both opposed ends of the

rigidifying insert extend from one or both opposed ends of the sleeve. The relative lengths of the sleeve and the rigidifying insert will be selected depending upon, amongst other factors, the type, configuration and positioning of the releasable restrainer utilized. For example, as discussed further below, depending upon the type, configuration and positioning of the releasable restrainer, the opposed ends of the sleeve may extend beyond the rigidifying insert positioned therein. Alternatively, the rigidifying insert may extend substantially between the opposed ends of the sleeve to define opposed first and second ends of the fork tine receiving member. In other words, the sleeve length and the insert length are substantially the same. In any event, preferably, the sleeve defines an outer surface of the fork tine receiving member, while the rigidifying insert defines an inner surface of the fork tine receiving member.

As indicated, the bulk bag is further comprised of a releasable restrainer for inhibiting the removal of the rigidifying insert from the sleeve. The releasable restrainer permits the selective removal or withdrawal of the rigidifying insert from the sleeve as desired or required for storage or transportation of the bulk bag. Thus, the releasable restrainer also inhibits, and preferably prevents or precludes, the accidental slippage or withdrawal of the rigidifying insert from the sleeve while the bulk bag is in use.

The releasable restrainer is associated with at least one of the pair of fork tine receiving members in order to inhibit the removal of at least one of the rigidifying inserts from its corresponding sleeve. However, preferably, a releasable restrainer is associated with each of the pair of fork tine receiving members in order to inhibit the removal of each of the rigidifying inserts from its respective corresponding sleeve. The particular type or manner of releasable restrainer utilized may be the same for each of the fork tine receiving members or it may differ between the fork tine receiving members.

In one embodiment, the releasable restrainer is comprised of a mating clamping component which clamps around the sleeve and onto the rigidifying insert. In this manner the rigidifying insert is clamped in position within the sleeve and cannot be withdrawn or removed until the mating clamping component is removed.

In a further embodiment wherein the opposed ends of the sleeve extend beyond the rigidifying insert positioned therein, the releasable restrainer is associated with each of the opposed ends to inhibit the removal of the rigidifying insert from the sleeve. The

releasable restrainer may be associated with the opposed ends of the sleeve in any manner permitting the releasable restrainer to function by inhibiting the removal of the rigidifying insert. Preferably, the releasable restrainer is fastened, affixed, mounted, attached or otherwise connected with each of the opposed ends. For instance, the releasable restrainer
5 may be comprised of elastic bands fastened, affixed, mounted, attached or otherwise connected with the opposed ends of the sleeve to elastically deform the opposed ends. The elastic bands constrict the opposed ends of the sleeve to preclude the rigidifying insert from being withdrawn from the sleeve.

10 In a preferred form of this embodiment, each of the opposed ends of the sleeve is comprised of a loop about at least a portion of a perimeter of the opposed end and wherein the releasable restrainer is inserted within the loop. For instance, where the releasable restrainer is comprised of elastic bands, the elastic bands may be inserted within the loops to elastically deform the opposed ends inwardly to inhibit the removal of the rigidifying insert.
15 Alternately, any form of cable, rope, chain, cord or tie may be inserted through the loop and drawn together or tightened to inwardly constrict the opposed ends of the sleeve to inhibit the removal of the rigidifying insert.

Further, as discussed above, each sleeve may be comprised of a material with
20 sufficient elasticity to stretch to receive the rigidifying insert and then contract to further inhibit the rigidifying insert from being removed from the sleeve. In this case, wherein the opposed ends of the sleeve extend beyond the rigidifying insert positioned therein, the opposed ends of the sleeve elastically contract inwardly to inhibit the rigidifying insert from being removed from the sleeve. In effect, the inward constriction of the opposed ends of the
25 sleeve decreases the size of opposed openings provided by the opposed ends of the sleeve, thus inhibiting or precluding the passage of the rigidifying insert therethrough. In other words, the rigidifying insert has an outer or perimetrical dimension larger than an outer or perimetrical dimension of the constricted or contracted openings at the opposed ends of the sleeve.

30 In this instance, wherein the sleeve is comprised of an elastic material, the releasable restrainer may be comprised of the inwardly contracted opposed ends of the sleeve. Alternately, the releasable restrainer may be associated with each of the inwardly contracted opposed ends of the sleeve to further inhibit the removal of the rigidifying insert from the

sleeve. The releasable restrainer may be associated with the inwardly constricted opposed ends of the sleeve in any manner permitting the releasable restrainer to function by inhibiting the removal of the rigidifying insert. Preferably, the releasable restrainer is fastened, affixed, mounted, attached or otherwise connected with each of the inwardly constricted opposed ends.

In a preferred form of this embodiment, wherein the sleeve is comprised of an elastic material, the releasable restrainer is comprised of a removable rigid retainer associated with each of the inwardly contracted opposed ends of the sleeve for precluding the stretching of the opposed ends sufficiently outwardly to permit the rigidifying insert to be removed from the sleeve. In other words, the removable rigid retainer substantially maintains the outer or perimetrical dimension of the constricted or contracted openings at the opposed ends of the sleeve.

Although any removable rigid retainer or retaining mechanism capable of performing this function may be used, the removable rigid retainer is preferably comprised of at least one rigid member extending about at least a portion of a perimeter of each of the opposed ends of the sleeve. The rigid member may be associated with the perimeter of each of the opposed ends of the sleeve in any manner permitting the rigid member to function by precluding the stretching of the opposed end sufficiently outwardly. Preferably, the rigid member is fastened, affixed, mounted, attached or otherwise connected with the perimeter of the opposed end. Preferably, each of the opposed ends of the sleeve is comprised of a loop about at least a portion of the perimeter of the opposed end and wherein the rigid member is inserted within the loop.

In yet a further embodiment, the releasable restrainer is comprised of at least one removable fastener for securing the rigidifying insert with the sleeve. However, preferably, the releasable restrainer is comprised of a plurality of removable fasteners for securing the rigidifying insert with the sleeve. The plurality of removable fasteners may be arranged or positioned longitudinally along the fork tine receiving member at any location permitting the removable fastener to secure the rigidifying insert with the sleeve. Preferably, the plurality of removable fasteners are spaced longitudinally along the sleeve length. Further, at least one removable fastener may secure the rigidifying insert with the sleeve proximate to at least one of the opposed first and second ends of the fork tine receiving

member. Preferably, at least one removable fastener secures the rigidifying insert with the sleeve proximate to each of the opposed first and second ends of the fork tine receiving member.

5 Further, the plurality of removable fasteners may be arranged or positioned perimetrically or circumferentially about the fork tine receiving member at any location permitting the removable fastener to secure the rigidifying insert with the sleeve. More particularly, the removable fasteners may be positioned or arranged at any location about the perimeter of the sleeve. For instance, where the sleeve depends from the bottom of the body
10 of the bulk bag, the fasteners may be arranged or positioned at any location in the sleeve relative to the bottom, including in the bottom itself where the sleeve is comprised of the bottom of the body of the bulk bag.

Further, each removable fastener may fasten, affix, attach, mount or otherwise
15 secure the rigidifying insert with the sleeve in any manner. However, preferably, each removable fastener extends between the outer surface and the inner surface of the tubular fork tine receiving member. Thus, the removable fastener preferably extends through the rigidifying insert and the sleeve. For this purpose, each of the sleeve and the rigidifying insert may define one or more corresponding slots for the extension of the removable fastener
20 therethrough.

Any type or configuration of removable fastener or fastening device or mechanism may be used which is suitable for securely fastening the rigidifying insert with the sleeve. Further, each of the removable fasteners may be of a different type or
25 configuration. Preferably, at least one removable fastener is comprised of a locking screw, a locking pin or a flexible tie extending between the outer surface and the inner surface of the fork tine receiving member for securing the rigidifying insert with the sleeve. The flexible tie may be a cable tie, a cord, a string or the like used for tying, fastening or binding.

30 The releasable restrainer may be further comprised of a reinforcing member associated with at least one removable fastener. Any type or configuration of reinforcing member including any reinforcing mechanism or device may be used which is suitable for reinforcing the fastener by enhancing or facilitating the securing of the rigidifying insert with the sleeve. Preferably, the reinforcing member is comprised of at least one reinforcing plate,

wherein the removable fastener extends through the reinforcing plate to secure the reinforcing plate with the fork tine receiving member. Thus, preferably, the fastener extends through each of the reinforcing plate, the sleeve and the rigidifying insert.

5 The reinforcing plate may be secured with one of the outer surface and the inner surface of the fork tine receiving member. Thus, the reinforcing plate may be positioned interiorly of the fork tine receiving member adjacent the rigidifying insert defining the inner surface of the fork tine receiving member. Alternately, the reinforcing plate may be positioned exteriorly of the fork tine receiving member adjacent the sleeve defining the outer
10 surface of the fork tine receiving member. However, preferably, the reinforcing member is comprised of a pair of reinforcing plates, wherein the removable fastener extends through the reinforcing plates to secure the reinforcing plates with the fork tine receiving member and wherein one of the pair of reinforcing plates is secured with the inner surface of the fork tine receiving member and the other of the pair of reinforcing plates is secured with the outer
15 surface of the fork tine receiving member. In other words, the rigidifying insert and the sleeve are both positioned or sandwiched between the reinforcing plates.

 Further, where the removable fastener is positioned proximate to one of the opposed first and second ends of the fork tine receiving member, the reinforcing plate will
20 similarly be secured in position adjacent or proximate to that opposed end. In this instance, the reinforcing plate may be comprised of a reinforcing end surface which extends from the reinforcing plate to abut the adjacent opposed end of the fork tine receiving member. Preferably, the reinforcing plate is secured with the outer surface of the fork tine receiving member such that the reinforcing end surface of the reinforcing plate abuts one of the
25 opposed ends of the fork tine receiving member.

 The reinforcing plate including the reinforcing end surface may have any size, shape or configuration suitable for reinforcing the fastener by enhancing or facilitating the securing of the rigidifying insert with the sleeve, while not significantly interfering with or
30 impeding the insertion of a fork tine within the fork tine receiving member. Where the rigidifying insert is comprised of a tubular member having at least three sides on cross-section such that the tubular member includes one or more corners therein as a result of the intersection or joining of the sides, the reinforcing plate and reinforcing end surface may have a wedge-shaped configuration. More particularly, the reinforcing plate is secured to the outer

surface of the fork tine receiving member at a corner defined by the rigidifying insert such that the reinforcing plate extends about the corner along two adjacent sides of the rigidifying insert. The reinforcing end surface extends from the reinforcing plate across the corner of the rigidifying insert in abutment with the adjacent opposed end of the fork tine receiving member.

In a further embodiment, at least one removable fastener may be comprised of a clamp having a pair of clamping arms, wherein the clamp is positioned at one of the opposed first and second ends of the fork tine receiving member such that the inner surface and the outer surface of the fork tine receiving member are secured between the clamping arms of the clamp. Accordingly, the clamping arms secure the rigidifying insert with the sleeve. Preferably, a clamp is positioned at each of the opposed first and second ends of the fork tine receiving member.

Any type or configuration of clamp or clamping mechanism or device may be used which is capable of holding, compressing or clamping the rigidifying insert and the sleeve between the clamping arms. For this purpose, the clamping arms are preferably inwardly biased in order to secure the rigidifying insert with the sleeve. However, where the clamping arms are not inwardly biased or where it is desirable to enhance the inward bias of the clamping arms, the clamping arms may be urged towards each other in any alternative manner or by any alternative mechanism for urging or moving the clamping arms into closer proximity with each other.

In addition, in order to enhance the securing of the fork tine receiving member between the clamping arms, an inner surface of at least one clamping arm may comprised of a gripping surface. Preferably, the inner surface of each of the clamping arms is comprised of a gripping surface for more securely contacting the adjacent inner and outer surfaces of the fork tine receiving member positioned therebetween. The gripping surface may have any configuration capable of firmly grasping or holding the adjacent surface of the fork tine receiving member. In the preferred embodiment, the gripping surface is comprised of a plurality of gripping teeth.

As well, in order to enhance the securing of the fork tine receiving member between the clamping arms, the removable fastener may be further comprised of a locking screw or a locking pin extending between the clamping arms of the clamp.

5 Finally, when using a fork lift to lift the bulk bag, the danger exists that the fork lift may rupture the bulk bag when attempting to insert fork tines into the fork tine receiving members. As a result, to provide some protection to the bulk bag, the bulk bag may be further comprised of a peripheral reinforcing impact panel secured to the sidewall adjacent the bottom of the bulk bag. Preferably, the peripheral reinforcing impact panel is secured to
10 the sidewall proximate to the tubular fork tine receiving members.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described with reference to the
15 accompanying drawings, in which:

Figure 1 is a side elevation view of a bulk bag having a pair of tubular fork
tine receiving members comprised of sleeves and rigidifying inserts, wherein the sleeves are
externally positioned;
20

Figure 2 is a side elevation view of a bulk bag having a pair of tubular fork
tine receiving members comprised of sleeves and rigidifying inserts, wherein the sleeves are
internally positioned;

25 Figure 3 is a bottom plan view of two pairs of fork tine receiving members;

Figure 4 is an end elevation view of an embodiment of a rigidifying insert
comprised of a tubular member having four wall members;

30 Figure 5 is an end elevation view of an embodiment of a rigidifying insert
comprised of a channel-form member;

Figure 6 is an end elevation view of the embodiment of the rigidifying insert
shown in Figure 5 inserted into a sleeve to form the fork tine receiving member;

Figure 7 is a side elevation view, in section, of the rigidifying insert illustrated in Figure 6 wherein the sleeve is comprised of an elastic material and showing the use of a removable rigid retainer to maintain the insert within the sleeve;

5

Figure 8 is an end elevation view of a rigidifying insert inserted within a sleeve showing an embodiment of a releasable restrainer;

Figure 9 is an exploded end elevation view of a rigidifying insert with a mating clamping component;

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Figure 10 is an exploded end elevation view of the embodiment of the rigidifying insert with the mating clamping component shown in Figure 9 and a sleeve;

15

Figure 11 is an end elevation view of the embodiment of the rigidifying insert with the mating clamping component shown in Figure 9, clamped onto a sleeve to form the fork tine receiving member;

Figure 12 is a side elevation view, in section, of the rigidifying insert illustrated in Figure 6 and showing the use of elastic bands to maintain the insert within the sleeve;

20

Figure 13 is the side elevation view of the bulk bag shown in Figure 1 including a plurality of locking pins or screws;

25

Figure 14 is a cross-sectional view of the fork tine receiving member taken along lines 14 - 14 of Figure 13;

Figure 15 is the side elevation view of the bulk bag shown in Figure 1 including a plurality of flexible ties;

30

Figure 16 is a cross-sectional view of the fork tine receiving member taken along lines 16 - 16 of Figure 15;

Figure 17 is a cross-sectional view of a fork tine receiving member showing a pair of reinforcing plates fastened by a plurality of locking pins or screws;

Figure 18 is a top elevation view of the fork tine receiving member shown in Figure 17, showing a plurality of upper reinforcing plates;

Figure 19 is a cross-sectional view of a fork tine receiving member showing a reinforcing plate comprised of a reinforcing end surface having a wedge-shape;

Figure 20 is a cross-sectional view of a fork tine receiving member showing a clamp secured with a bottom member of the rigidifying insert;

Figure 21 is a cross-sectional view of a fork tine receiving member showing a clamp secured with each of two opposed side members of the rigidifying insert; and

Figure 22 is a side sectional view of the clamp shown in Figure 20.

DETAILED DESCRIPTION

Referring to Figure 1, the present invention is directed at a bulk bag (20) of a type comprising a flexible body (22) having a bottom (24) and a sidewall (26). The sidewall (26) is a circumferential or perimetrical side wall (26) extending upwardly from the bottom (24) and may include one or more bag handling loops (28). The body (22), including the bottom (24) and the sidewall (26), may be integrally formed or manufactured as a single unit or may be formed or manufactured as two or more units or sections which are attached, affixed, fastened or otherwise joined together to provide the body (22). Further, the body (22) may be comprised of any flexible material suitable for use as a bulk bag, including those materials conventionally used in the industry for such purposes.

Further, as shown in Figure 1, the bulk bag (20) is comprised of at least one pair of tubular fork tine receiving members (30) associated with the body (22) and arranged in a substantially parallel spaced relationship such that fork tines from a fork lift are insertable into the receiving members (30) to lift the body (22). Each fork tine receiving member (30) is comprised of a flexible sleeve (32) and a removable rigidifying insert (34)

which is positioned within the sleeve (32) to facilitate the receipt of the fork tine in the receiving member (30).

The pair of fork tine receiving members (30) may be associated with any part
5 or portion of the body (22) of the bulk bag (20) so long as the fork tine receiving members (30) are positioned at a location compatible with ready access by the fork tines of the fork lift. For instance, the fork tine receiving members (30) may be associated with the sidewall (26) of the body (22). However, as shown in Figures 1 and 2, the fork tine receiving members (30) are preferably associated with the bottom (24) of the body (22) of the bulk bag (20).
10 Further, the fork tine receiving members (30) are preferably spaced a distance apart compatible with the standard spacing of the fork tines of a conventional fork lift, although any spacing of the fork tine receiving members (30) may be provided.

Further, as indicated, the bulk bag (20) includes at least one pair of fork tine
15 receiving members (30) for receiving the fork tines of the fork lift from two sides of the bulk bag (20) or from two opposed directions. However, where there is a need or a desire to be able to approach the bulk bag (20) for lifting from four sides of the bulk bag (20) or from four directions, the bulk bag (20) may be comprised of two pairs of tubular fork tine receiving members (30) as shown in Figure 3. Referring to Figure 3, in this instance, a first pair of
20 tubular fork tine receiving members (30a) preferably intersects or crosses substantially perpendicularly a second pair of tubular fork tine receiving members (30b). A forklift can then approach a loaded bulk bag from any of four directions or sides of the bulk bag (20) and insert fork tines into one of either the first pair of fork tine receiving members (30a) or the second pair of fork tine receiving members (30b).

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In order to accommodate two pairs of receiving members (30), two pairs of intersecting or crossing sleeves (32) are preferably provided across the bottom (24) of the body (22), and two pairs of intersecting or crossing rigidifying inserts (34) are preferably provided for insertion in the sleeves (32). This can be accomplished by providing
30 communication between the sleeves (32) at the point of their intersection and by providing notches in the rigidifying inserts (34) at their points of intersection so that they can be assembled in a single plane and still permit fork tines to access either pair of receiving members (30a) or (30b). Alternatively, the two pairs of receiving members (30a, 30b) may

be located in different planes along the bottom (24) of the body (22), thus eliminating the need for intersecting or crossing sleeves (32) and rigidifying inserts (34).

As indicated, each tubular fork tine receiving member (30) is comprised of a
5 flexible sleeve (32) and a removable rigidifying insert (34) positioned therein to facilitate the receipt of the fork tine in the receiving member (30). The flexible sleeve (32) may be formed distinctly or separately from the body (22) of the bulk bag (20) or the sleeve (32) may be comprised of and defined, at least in part, by a portion or section of the body (22). More particularly, where the fork tine receiving members (30) are associated with the bottom (24)
10 of the body (22), the sleeve (32) may be comprised of the bottom (24) of the body (22). In other words, the bottom (24) may form or define the flexible sleeve (32) at least in part.

In this instance, where the sleeve (32) is comprised of the bottom (24) of the body (22), the sleeve (32) may be integrally formed or manufactured with the bottom (24) as
15 a unit. Alternately, the sleeve (32), or a part thereof, may be separately formed or manufactured and subsequently affixed, fastened or attached with the bottom (24) to provide the finished or complete sleeve (32). Further, the finished or complete flexible sleeves (32) may be positioned relative to the bottom (24) of the bulk bag (20) such that the flexible sleeves (32) are located interiorly of the body (22) as shown in Figure 2, or exteriorly of the
20 body (22) as shown in Figure 1. In Figure 2, the interior location of the sleeves (32) provides the bulk bag (20) with a relatively flat lowermost surface, which may be desirable in some circumstances such as where the bag (20) is to sit or be supported upon the ground. Preferably, the flexible sleeves (32) are located exteriorly of the body (22) of the bulk bag (20) as shown in Figure 1.

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Referring more particularly to Figure 2, the sleeve (32) is located interiorly or is positioned within the body (22) of the bulk bag (20). In this case, the bottom (24) of the body (22) is defined by the lowermost surface of the body (22) and provides a relatively flat surface. Further, the sleeve (32) is comprised in part of the bottom (24) of the body (22).
30 The sleeve (32) may be located at any position relative to the sidewall (26) compatible with receiving the fork tines in the fork tine receiving member (30). However, preferably, the sleeve (32) abuts against the sidewall (26) such that the sleeve (32) is further comprised in part of the adjacent sidewall (26). In the preferred embodiment as shown in Figure 1, each sleeve (32) is located exteriorly of the body (22) of the bulk bag (20). Further, the sleeve (32)

of each fork tine receiving member (30) depends from the bottom (24) of the body (22) of the bulk bag (20), wherein the sleeve (32) is comprised in part of the bottom (24).

5 In order to facilitate the insertion of the fork tine therein, at least one and preferably each of the rigidifying inserts (34) is comprised of a tubular member. The tubular member (34) is preferably an elongate, hollow member having a shape, size and configuration suitable for the receipt of the fork tine therein. The tubular member (34) may have any shape or configuration on cross-section which is receivable within the flexible sleeve (32) and which permits the insertion of the fork tine. Further, the tubular member (34)
10 has opposed ends (36) defining an insert length therebetween.

For instance, as shown in Figure 4, the tubular member (34) preferably has a four-sided square or rectangular configuration on cross-section. Thus, the tubular member (34) includes a top member (38), a bottom member (40) and two opposed side members (42)
15 defining a cavity (44) therein for receipt of the fork tine.

Alternately, as shown in Figures 5 and 6, the tubular member (34) may be comprised of a channel-form member having a three-sided configuration of a square or a rectangle on cross-section. A channel form of rigidifying insert (34) may be preferable in
20 some circumstances given that it may require less space during transportation.

Referring to Figure 5, the channel-form member (34) preferably has a cross section shape that is substantially an inverted square or rectangular channel. The channel-form member (34) similarly includes a top member (38) and two opposed side members (42)
25 preferably in parallel spaced relationship. The top member (38) is rigidly affixed with each of the side members (42) preferably at an angle close to 90 degrees. A bottom edge (46) of the side members (42) is smooth thereby preventing tearing when the channel-form member (34) is inserted into the sleeve (32).

30 Referring to Figure 6, the channel-form member (34) is preferably inserted into the sleeve (32) so that the top member (38) lies in a substantially coplanar attitude with and supports the bottom (24) of the body (22) of the bulk bag (20). The cavity (44) of the fork tine receiving member (30) is thus defined or formed therein by the top member (38), the opposed side members (42), and a section of the sleeve (32) spanning a space between the

bottom edges (46) of the side members (42). As above, the cavity (44) so formed is ready to receive a fork tine (not shown) from a forklift.

The rigidifying insert, being preferably the tubular member (34), may be comprised of any relatively rigid material capable of maintaining the cavity (44) therein for receipt of the fork tine during use of the bulk bag (20). Preferably, the tubular member (34) is comprised of a thermoplastic and is preferably of a gauge between 0.110 and 0.300. Further, in the preferred embodiment, each side member (42) has a height of between 2 inches (5.08 cm) and 5 inches (12.7 cm) and the top member (38) and the bottom member (40), if any, have a width of between 4 inches (10.16 cm) and 12 inches (30.48 cm). However, the dimensions of the tubular member (34) may vary depending upon, amongst other factors, the dimensions of the sleeve (32) the body (22) and the intended maximum weight to be carried in the body (22) of the bulk bag (20).

The sleeve (32) may be comprised of any flexible material permitting the receipt and removal of the rigidifying insert (34) therein. For instance, referring to Figures 4 and 7, the sleeve (32) may be comprised of a material with sufficient elasticity to stretch to receive the rigidifying insert (34) and then contract or constrict inwardly to inhibit the rigidifying insert (34) from being removed or withdrawn from the sleeve (32). Figure 4 shows a 4-sided tubular member (34) maintained within the sleeve (32), while Figure 7 shows a channel-form member (34) maintained therein.

More particularly, the flexible sleeve (32) may be comprised of an elastic material such that the flexible sleeve (32) has a relaxed state and a stretched state. In the stretched state, the sleeve (32) is elastically deformed from the relaxed state to accommodate the insertion of the rigidifying insert (34) therein. Further, the flexible sleeve (32) has an outer or perimetrical dimension in the relaxed state which is smaller than an outer or perimetrical dimension of the rigidifying insert (34). Thus, the sleeve (32) continues to be held in a stretched state so long as the rigidifying insert (34) is positioned within the sleeve (32). Accordingly, the rigidifying insert (34) is inhibited from being withdrawn or removed from the sleeve (32) by the elastic properties or nature of the material of the sleeve (32).

In this embodiment, the flexible sleeve (32) may be comprised of any material having sufficient elasticity to stretch to receive the rigidifying insert (34) and then contract to

inhibit the rigidifying insert (34) from being withdrawn from the sleeve (32). However, preferably, the sleeve (32) is comprised of a flex plastic, which may be either in the form of a woven material or may be provided in a sheet form. Further, the flex plastic is preferably comprised of ethylene vinyl acetate ("EVA").

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In addition, in the preferred embodiment, the bulk bag (20) is comprised of a releasable restrainer (48) for inhibiting the removal of the rigidifying insert (34) from the sleeve (32). The releasable restrainer (48) permits the selective removal or withdrawal of the rigidifying insert (34) from the sleeve (32) as desired or required for storage or transportation
10 of the bulk bag (20). Thus, the releasable restrainer (48) also inhibits, and preferably prevents or precludes, the accidental slippage or withdrawal of the rigidifying insert (34) from the sleeve (32) while the bulk bag (20) is in use.

The releasable restrainer (48) is associated with at least one, and preferably
15 both, of the pair of fork tine receiving members (30). The releasable restrainer (48) may be comprised of any member, mechanism, device, structure or arrangement of parts or members suitable for and capable of inhibiting or restraining the removal of the rigidifying insert (34) from the sleeve (32). Further, the particular releasable restrainer (48) utilized may be the same for each of the fork tine receiving members (30) or it may differ between the fork tine
20 receiving members (30).

Where the sleeve (32) is comprised of an elastic material, the releasable restrainer (48) may be comprised of the sleeve (32) itself which stretches to receive the rigidifying insert (34) and contracts to inhibit the removal of the rigidifying insert (34).
25 However, preferably, the elastic sleeve (32) enhances the action or functioning of the releasable restrainer (48) by further inhibiting the removal of the rigidifying insert (34) from the sleeve (32).

As indicated above, each sleeve (32) has opposed ends (33) defining the
30 sleeve length therebetween. Similarly, the rigidifying insert (34) has opposed ends (36) defining the insert length therebetween. The sleeve length and the insert length may be selected such that the rigidifying insert (34) is contained within the sleeve (32), wherein the sleeve length is greater than the insert length. Alternately, the sleeve length and the insert length may be selected such that one or both opposed ends (36) of the rigidifying insert (34)

extend from one or both opposed ends (33) of the sleeve (32). The relative lengths of the sleeve (32) and the rigidifying insert (34) will be selected depending upon, amongst other factors, the type, configuration and positioning of the releasable restrainer (48) utilized. For example, as discussed further below, depending upon the type, configuration and positioning of the releasable restrainer (48), the opposed ends (33) of the sleeve (32) may extend beyond the rigidifying insert (34) positioned therein. Alternatively, the rigidifying insert (34) may extend substantially between the opposed ends (33) of the sleeve (32) to define opposed first and second ends (50) of the fork tine receiving member (30). In other words, the sleeve length and the insert length are substantially the same. Further, the sleeve (32) preferably defines an outer surface (52) of the fork tine receiving member (30), while the rigidifying insert (34) defines an inner surface (54) of the fork tine receiving member (30).

In addition, the sleeve (32) is preferably continuous between the opposed ends (33) of the sleeve (32). In other words, as shown in Figure 7, the material comprising the sleeve (32) preferably extends for the entire sleeve length between the opposed ends (33). However, alternately, as shown in Figure 8, the sleeve (32) may be comprised of two or more bands, straps or loops (58) spaced longitudinally along the rigidifying insert (34). The outermost bands (58) define the opposed ends (33) of the sleeve (32). Thus, the rigidifying insert (34) is positioned in the sleeve (32) by inserting the rigidifying insert (34) through each of the bands (58) comprising the sleeve (32). The width of each band (58) may vary and each band (58) may be comprised of any flexible material as discussed above. For instance, where a relatively narrow band (58) is desired, the band (58) may be comprised of a cable, rope or flexible tie such as a cable tie.

Referring to Figure 8, where the sleeve (32) is comprised of a plurality of bands (56), the releasable restrainer (48) may be comprised of the rigidifying insert (34) defining at least two slots or openings (58) therein which are adapted and spaced therein for extending at least one band (56) therethrough. For instance, as shown in Figure 8, the band (56) extends from a connection with the bottom (24) of the body (22) along one side member (42) of the tubular member (34) to pass through a first slot (58) in the side member (42) to enter the cavity (44). The band (56) then extends across the cavity (44) to the opposed side member (42) to pass through a corresponding second slot (58) to exit the cavity (44). Finally, the band (56) extends from the second slot (58) to the bottom (24) of the body (22) along the opposed side member (42) for connection with the bottom (24). The band (56) may be

connected with the bottom (24) in any manner permitting the release of at least one end of the band (56) in order to permit the removal of the tubular member (34).

Referring to Figures 9 - 11, in a further embodiment of the releasable
5 restrainer (48), the releasable restrainer (48) is comprised of a mating clamping component (60) which clamps around the sleeve (32) and onto the rigidifying insert (34). In this manner the rigidifying insert (34) is clamped in position within the sleeve (32) and cannot be withdrawn or removed until the mating clamping component (60) is removed.

10 Referring to Figure 9, in this embodiment, the rigidifying insert (34) is comprised of a channel-form member. However, the bottom edge (46) of each side member (42) of the channel-form member (34) is comprised of an angular "J" shaped foot (62) forming a channel (64) external to and along the length of the bottom edge (46). A mating component (60) is provided that has a planar base (66) with opposed parallel edges (68). An
15 angular hook shaped member (70) extends along the length of each edge (68), spaced above a top face (72) of the base (66). The hook member (70) preferably has an engagement lip (74).

Referring to Figure 10, the channel-form member (34) fits loosely within sleeve (32). When the channel-form member (34) is inserted into the sleeve (32), the top
20 member (38) preferably lies in a substantially coplanar attitude with and supports the bottom (24) of the body (22). Referring to Figure 11, the mating component (60) mates with the "J" shaped foot (62) on each opposed side member (42) of the channel-form member (34). When so mated, the engagement lip (74) of the hook member (70) is positioned in the channel (64) of the "J" shaped foot (62). This clamps the channel-form member (34) with the sleeve (32),
25 thereby inhibiting or precluding the channel-form member (34) from accidentally being withdrawn or removed from the sleeve (32).

In use, this embodiment of the bulk bag (20) is provided in a compactly folded form with the channel-form members (34) withdrawn from the sleeves (32). The body (22) is
30 unfolded and the channel-form members (34) are inserted into the sleeves (32), as illustrated in Figure 10. The engagement lip (74) of the hook member (70) of the mating component (60) is then mated with the channel (64) to clamp the channel-form member (34) onto the sleeve (32). The body (22) is filled with a load and the fork tines of a forklift are inserted into the fork tine receiving members (30) to lift and move the bulk bag (20). When the load

has been discharged from the body (22), the mating component (60) is removed to enable the removal of the channel-form member (34) from the sleeve (32). The body (22) can then be folded in preparation for the bulk bag (20) and the channel-form members (34) being stored or transported in a compact form.

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In a further embodiment wherein the opposed ends (33) of the sleeve (32) extend beyond the rigidifying insert (34) positioned therein, the releasable restrainer (48) may be associated with each of the opposed ends (33) to inhibit the removal of the rigidifying insert (34) from the sleeve (32). The releasable restrainer (48) is preferably fastened, affixed, mounted, attached or otherwise connected or embedded with each of the opposed ends (33). For instance, referring to Figure 12, each of the opposed ends (33) of the sleeve (32) may be comprised of a loop (76) about at least a portion of a perimeter of the opposed end (33). The releasable restrainer (48) may be inserted within the loop (76). The releasable retainer (48) in this case may be comprised of a cable, rope, chain, cord or tie inserted through the loop (76) and drawn together or tightened to inwardly constrict the opposed ends (33) of the sleeve (32) to inhibit the removal of the rigidifying insert (34).

However, preferably in this embodiment, referring to Figure 12, the releasable restrainer (48) is comprised of an elastic band (78) fastened, affixed, mounted, attached or otherwise connected with each opposed end (33) of the sleeve (32) to elastically deform the opposed end (33). The elastic band (76) constricts the opposed end (33) of the sleeve (32) to preclude the rigidifying insert (34), shown as a channel-form member in Figure 12, from being withdrawn from the sleeve (32).

Referring to Figure 12, the elastic band (78) is associated with the opposed end (33) of each sleeve (32). The rigidifying insert (34) is installed by expanding the elastic bands (78). When the rigidifying insert (34) is installed within the sleeve (32), each elastic band (78) is positioned between the rigidifying insert (34), indicated by a dotted line in Figure 12, and an opening (80) at each opposed end (33) of the sleeve (32). Each elastic band (78) elastically deforms the opposed end (33) inwardly, thereby precluding the rigidifying insert (34) from accidentally being withdrawn through the opening (80). However, as discussed further below, the same effect can be obtained by having the entire sleeve (32) made from an elastic material.

As discussed above, each sleeve (32) may be comprised of a material with sufficient elasticity to stretch to receive the rigidifying insert (34) and then contract to inhibit the rigidifying insert (34) from being removed from the sleeve (32). In this case, referring to Figure 7, where the opposed ends (33) of the sleeve (32) extend beyond the rigidifying insert (34) positioned therein, the opposed ends (33) of the sleeve (32) also elastically contract or constrict inwardly to further inhibit the rigidifying insert (34) from being removed from the sleeve (32). In effect, the inward constriction of the opposed ends (50) of the sleeve (32), or contraction towards the relaxed state of the elastic material, causes a decrease in the size of the openings (80) provided at and defined by the opposed ends (33) of the sleeve (32). This decreased size of the openings (80) also inhibits or precludes the passage of the rigidifying insert (34) therethrough. In other words, the outer or perimetrical dimension of the rigidifying insert (34), indicated by the dotted line in Figure 7, is larger than an outer or perimetrical dimension of the constricted or contracted openings (80) at the opposed ends (33) of the sleeve (32). In this embodiment, the releasable restrainer (48) is comprised of the inwardly contracted opposed ends (33) of the sleeve (32).

Alternately, the releasable restrainer (48) may be associated with each of the inwardly contracted opposed ends (33) of the sleeve (32) to further inhibit the removal of the rigidifying insert (34) from the sleeve (32). For instance, referring to Figure 7, wherein the sleeve (32) is comprised of an elastic material, the releasable restrainer (48) may be comprised of a removable rigid retainer (82) associated with each of the inwardly contracted opposed ends (33) of the sleeve (32) for precluding the stretching of the opposed ends (33) sufficiently outwardly to permit the rigidifying insert (34) to be removed from the sleeve (32). In other words, the removable rigid retainer (82) substantially maintains the outer or perimetrical dimension of the constricted or contracted openings (80) at the opposed ends (33) of the sleeve (32).

Any removable rigid retainer (82) may be used which is capable of precluding the stretching of the opposed ends (33) outwardly a sufficient amount or distance to permit the rigidifying insert (34) to be withdrawn from the sleeve (32). However, the removable rigid retainer (82) is preferably comprised of at least one rigid member (84) extending about at least a portion of the perimeter of each of the opposed ends (33) of the sleeve (32). The rigid member (84) may be associated with the respective opposed end (33) of the sleeve (32) in any manner and by any mounting or fastening mechanism or structure such that the rigid

member (84) is connected, attached, fastened or otherwise affixed with the sleeve (32) in the desired position.

However, in the preferred form of this embodiment as shown in Figure 7, each
5 of the opposed ends (33) of the sleeve (32) is comprised of a loop (76) about at least a portion of the perimeter of the opposed end (33) of the sleeve (32) and the rigid member (84) is insertable within the loop (76). A separate loop (76) comprised of an elastic material, as described above, may be attached, connected, fastened or otherwise affixed with the end (33) of the sleeve (32). However, preferably, the loop (76) is integrally formed from the elastic
10 material comprising the sleeve (32), in any suitable manner, such as by folding a portion of the material of the sleeve (32) upon itself and stitching or otherwise affixing the loop (76) thereto. Thus, when desired, the rigid member (84), such as a rigid bar, ring or hasp, may be passed through the loop (76) to preclude the outward stretching of the opposed end (33) of the sleeve (32) and inhibit removal of the rigidifying insert (34) therefrom. Conversely, when
15 removal of the rigidifying insert (34) is desired, the rigid member (84) is removed and the opposed end (33) of the sleeve (32) is permitted to stretch outwardly or to be further elastically deformed to permit the removal of the insert (34).

In yet a further embodiment as shown in Figures 13 - 22, the releasable
20 restrainer (48) is comprised of at least one removable fastener (86) for securing the rigidifying insert (34) with the sleeve (32). However, preferably, the releasable restrainer (48) is comprised of a plurality of removable fasteners (86) associated with each fork tine receiving member (30) for securing the rigidifying insert (34) with the sleeve (32). Each of the removable fasteners (86) may be arranged or positioned longitudinally along the fork tine
25 receiving member (30) at any location permitting the removable fastener (86) to secure the rigidifying insert (34) with the sleeve (32). However, where there is greater than one removable fastener (86), the removable fasteners (86) are preferably spaced apart longitudinally along the sleeve length as shown in Figures 13, 15 and 18. In other words, the removable fasteners (86) are a spaced distance apart longitudinally along the fork tine
30 receiving member (30) to facilitate the securing of the rigidifying insert (34) with the sleeve (32) along each of the insert length and sleeve length respectively. In this embodiment, each of the removable fasteners (86) may be located at any position relative to the opposed ends (33) of the sleeve (32) and the opposed ends (36) of the rigidifying insert (34).

However, in a further embodiment as shown in Figures 19 – 22, the rigidifying insert (34) extends substantially between the opposed ends (33) of the sleeve (32) to define the opposed first and second ends (50) of the fork tine receiving member (30). In this embodiment, at least one removable fastener (86) is positioned and adapted to secure the rigidifying insert (34) with the sleeve (32) at, adjacent or in proximity to at least one, and preferably both, of the opposed first and second ends (50) of the fork tine receiving member (30).

In either embodiment, any type or configuration of removable fastener (86) including any type or configuration of fastening device or mechanism may be used which is suitable for securely fastening the rigidifying insert (46) with the sleeve (32). However, the preferred types of removable fastener (86) for each embodiment are discussed in detail below. Further, each of the removable fasteners (86) may be of a different type or configuration.

Each removable fastener (86) may fasten, affix, attach, mount or otherwise secure the rigidifying insert (34) with the sleeve (32) in any manner. However, preferably, the removable fastener (86) extends between the outer surface (52) and the inner surface (54) of the fork tine receiving member (30), as shown in Figures 14, 16, 17 and 19 - 22. In some embodiments, such as in Figures 14, 16, 17 and 19, each removable fastener (86) extends or passes through each of the rigidifying insert (34) and the sleeve (32). For this purpose, the sleeve (32) may define a slot (88) or opening therein for the passage or extension of the removable fastener (86) therethrough. Similarly, the rigidifying insert (34) may define a slot (90) or opening therein corresponding to the slot (88) in the sleeve (32) such that the removable fastener (86) may pass or extend through each of the sleeve (32) and the rigidifying insert (34). In alternate embodiments, such as in Figures 20 – 22, the fastener (86) extends between the inner and outer surfaces (54, 52) of the fork tine receiving member (30) without necessarily passing through the sleeve (32) and the rigidifying insert (34).

Further, the plurality of removable fasteners (86) may be arranged or positioned perimetrically or circumferentially about the fork tine receiving member (30) at any location permitting the removable fastener (86) to secure the rigidifying insert (34) with the sleeve (32). More particularly, the removable fasteners (86) may be positioned or arranged at any location about the perimeter of the sleeve (32) depending upon the

configuration of the rigidifying insert (34) therein. For instance, where the rigidifying insert (34) is comprised of a tubular member, each fastener (86) may be positioned such that the fastener (86) extends between the inner and outer surfaces (54, 52) of the fork tine receiving member (30) at or adjacent at least one of the top member (38), either of the opposed side members (42) or the bottom member (40), if any.

Referring to Figures 17 – 18, the fastener (86) is associated with the top member (38) of the tubular member (34). Referring to Figures 13 – 16 and 21, the fastener (86) is associated with one or both of the side members (42) of the tubular member (34). Referring to Figures 20 and 22, the fastener (86) is associated with the bottom member (40) of the tubular member (34). Referring to Figure 19, the fastener (86) is associated with both one side member (42) and the bottom member (40) of the tubular member (34).

Referring to Figures 13 – 19, at least one removable fastener (86) may be comprised of a locking screw or locking pin (92) or a flexible tie (94) extending between the outer surface (52) and the inner surface (54) of the fork tine receiving member (30). The flexible tie (94) may be a cable tie, a cord, a string or the like used for tying, fastening or binding. Specifically, the fastener (86) shown in Figures 13 – 14 and 17 – 19 is comprised of a locking pin or a locking screw (92), while the fastener (86) shown in Figures 15 – 16 is comprised of a flexible tie (94). In each embodiment, the removable fastener (86) extends or passes through each of the sleeve (32) and the rigidifying insert (34) and is adapted to secure the rigidifying insert (34) with the sleeve (32).

More particularly, in Figures 13 – 14, the locking screw or pin (92) extends through corresponding slots (88, 90) in the sleeve (32) and the rigidifying insert (34) and is adapted at its opposed ends to be secured or affixed in position at or adjacent each of the inner and outer surfaces (54, 52) of the fork tine receiving member (30) in any suitable manner to preclude the accidental removal or withdrawal of the locking screw or pin (92) from the slots (88, 90). For instance, one end or head (96) of the locking pin or screw (92) may be sized to inhibit its passage through the slots (88, 90), while the other end (98) may include a nut or other structure adapted to releasably secure the locking screw or pin (92) in its desired position.

In Figures 15 – 16, the flexible tie (94) extends through a pair of corresponding slots (88, 90) in the sleeve (32) and the rigidifying insert (34) and is adapted at its opposed ends to be secured or affixed in position at or adjacent one of the inner and outer surfaces (54, 52) of the fork tine receiving member (30), preferably the outer surface (52) as shown, in any suitable manner to preclude the accidental removal or withdrawal of the flexible tie (94) from the pair of corresponding slots (88, 90). For instance, the opposed ends of the flexible tie (94) may be releasably fastened, tied or connected together in any manner and by any mechanism, structure or device, preferably adjacent the outer surface (52) of the fork tine receiving member (30) for ease of access thereto.

In addition, the releasable restrainer (48) may be further comprised of a reinforcing member (100) associated with at least one removable fastener (86). The reinforcing member (100) may be comprised of any reinforcing structure, mechanism or device suitable for reinforcing the fastener (86) by enhancing or facilitating the securing of the rigidifying insert (34) with the sleeve (32). In a preferred form of this embodiment, the removable fastener (86) is comprised of a locking pin or screw (92) as shown in Figures 17 – 19. Further, the reinforcing member (100) is comprised of at least one reinforcing plate (102), wherein the locking pin or screw (92) further secures the reinforcing plate (102) with the fork tine receiving member (30).

The locking pin or screw (92) may fasten, affix, attach, mount or otherwise secure the reinforcing plate with the fork tine receiving member (30) in any manner. However, preferably, the locking pin or screw (92) extends through the reinforcing plate (102) to secure the reinforcing plate (102) with the fork tine receiving member (30). For this purpose, the reinforcing plate (102) may define a slot (104) or opening therein for the passage or extension of the locking pin or screw (92) therethrough. Thus, the slot (104) is configured to correspond and be compatible with the slots (88, 90) in the sleeve (32) and the rigidifying insert (34). Further, as shown in Figures 17 – 18, a plurality of fasteners (86) may extend through a single reinforcing plate (102). Alternately, a reinforcing plate (102) may be provided for each fastener (86).

The reinforcing plate (102) may be secured with one of the outer surface (52) and the inner surface (54) of the fork tine receiving member (30). Thus, the reinforcing plate

(102) may be positioned interiorly of the fork tine receiving member (30) adjacent the rigidifying insert (34) defining the inner surface (54) of the fork tine receiving member (30). Alternately, as shown in Figure 19, the reinforcing plate (102) may be positioned exteriorly of the fork tine receiving member (30) adjacent the sleeve (32) defining the outer surface (52) of the fork tine receiving member (30).

As well, in a preferred embodiment shown in Figures 17 – 18, the reinforcing member (100) is comprised of a pair of reinforcing plates (102), wherein the removable fastener (86), shown as a locking pin or screw (92) in Figures 17 – 18, extends through each of the reinforcing plates (102) to secure the reinforcing plates (102) with the fork tine receiving member (30). More particularly, one of the pair of reinforcing plates (102) is secured with the inner surface (54) of the fork tine receiving member (30) and the other of the pair of reinforcing plates (102) is secured with the outer surface (52) of the fork tine receiving member (30). In other words, the rigidifying insert (34) and the sleeve (32) are both positioned or sandwiched between the reinforcing plates (102).

In yet a further embodiment, where the removable fastener (86) is positioned proximate to one of the opposed first and second ends (50) of the fork tine receiving member (30), the reinforcing plate (102) is similarly secured in position adjacent or proximate to that opposed end (50). In this instance, the reinforcing plate (102) may be comprised of a reinforcing end surface (106) as shown in Figure 19. The reinforcing end surface (106) extends from the reinforcing plate (102), preferably at about a 90 degree angle, to abut the adjacent opposed end (50) of the fork tine receiving member (30). In this instance, the reinforcing plate (102) is preferably secured with the outer surface (52) of the fork tine receiving member (30) such that the reinforcing end surface (106) extends inwardly from the reinforcing plate (102) within the cavity (38) defined by the rigidifying insert (34). For this reason, the reinforcing end surface (106) is sized and configured to abut the adjacent opposed end (50) of the fork tine receiving member (30), while not significantly interfering with or impeding the insertion of the fork tine in the cavity (38).

Referring to Figure 19, where the rigidifying insert (34) is comprised of a tubular member defining at least one corner therein, the reinforcing plate (102) and the reinforcing end surface (106) may be positioned at or about the corner. The configuration of

the reinforcing plate (102) and the preferred configuration of the reinforcing end surface (106) in this embodiment provide a wedge-shaped element shaped and are particularly adapted for receiving the corner of the tubular member (34). In the preferred form of this embodiment, the reinforcing plate (102) is secured to the outer surface (52) of the fork tine receiving member (30) at or about at least one corner defined by the tubular member (34). In other words, the reinforcing plate (102) is shaped to provide a corresponding corner such that when the reinforcing plate (102) is in position, the reinforcing plate (102) extends about the corner of the tubular member (34). Referring to Figure 19, the reinforcing plate (102) extends about at least one corner, and preferably both corners, defined or provided between the intersection or point of connection of one side member (42) and the bottom member (40) of the tubular member (34). The reinforcing end surface (106) extends from the reinforcing plate (102) across the corner of the tubular member (34) in abutment with the adjacent opposed end (50) of the fork tine receiving member (30). As described above, the reinforcing plate (102) is secured in position at the corner of the tubular member (34) by at least one removable fastener (86). Further, as described above, the reinforcing end surface (106) is sized and configured such that it will not significantly interfere with or impede the receipt of a fork tine within the fork tine receiving member (30).

Referring to Figures 20 – 22, in a final embodiment, at least one removable fastener (86) may be comprised of a clamp (108) having a pair of clamping arms (110). The clamp (108) is positioned at one of the opposed first and second ends (50) of the fork tine receiving member (30) such that the inner surface (54) and the outer surface (52) of the fork tine receiving member (30) are secured between the clamping arms (110). Preferably, a clamp (108) is positioned at each of the opposed first and second ends (50) of the fork tine receiving member (30). Further, the clamp (108) may be positioned at any location about the perimeter or the circumference of the opposed end (50). For instance, referring to Figure 20, a single clamp (108) or a plurality of clamps (108) may be positioned along the bottom member (40) of the tubular member (34) for all, or a portion of, the bottom member (40). Referring to Figure 21, a single clamp (108) or a plurality of clamps (108) may be positioned along either or both of the opposed side members (42) of the tubular member (34) for all, or a portion of, that side member (42).

Preferably, the clamping arms (110) of the clamp (108) are inwardly biased, being biased or urged in a direction towards each other or into closer proximity to firmly secure the fork tine receiving member (30) therebetween. As well, each clamping arm (110) has an inner surface (112) and an outer surface (114). As shown in Figure 22, the inner surface (112) of at least one of the clamping arms (110) is preferably comprised of a gripping surface (116) for enhancing the clamping action of the clamping arms (110). Any configuration of gripping surface (116) may be used, however, preferably the gripping surface (116) is comprised of a plurality of gripping teeth.

In addition, where desired or required to further enhance the clamping action of the clamping arms (110), the removable fastener (86), being the clamp (108), may be further comprised of at least one locking screw or locking pin (92), and preferably a plurality thereof, as described in detail above. Referring to Figures 20 – 22, the locking screw or pin (92) preferably extends from the outer surface (114) of one clamping arm (110) to the opposed clamping arm (110). In other words, the locking pin or screw (92) extends between the clamping arms (110) of the clamp (108) to inhibit the clamping arms (110) from being moved in a direction away from or out of proximity with each other such that the fork tine receiving member (30) may be removed or withdrawn from between the clamping arms (110).

When using a fork lift to lift the bulk bag (20), the danger exists that the fork lift may rupture the bulk bag (20) when attempting to insert fork tines into the fork tine receiving members (30). As a result, to provide some protection to the bulk bag (20), the bulk bag (20) may be further comprised of a peripheral reinforcing impact panel (118) as shown in Figure 1. Preferably, the impact panel (118) is secured or affixed to the sidewall (26) at, adjacent or in proximity to the bottom (24) of the body (22) of the bulk bag (20). More preferably, the impact panel (118) is secured to the sidewall (26) proximate to the tubular fork tine receiving members (30). The impact panel (118) may be comprised of any material capable of providing some enhanced protection to the body (22) of the bulk bag (20) or capable of enhancing the puncture resistance of the body (22). Further, the impact panel (118) may be permanently or removably secured or affixed to the body (22) in any manner.

Finally, the fork tines to be inserted in the fork tine receiving members (30) may include a pallet jack structure (not shown) including a front wheel which requires ground

contact for proper operation. In this case, the dimensions or size of the sleeve (32) and the rigidifying insert (34) may need to be adjusted in order to accommodate and accept the pallet jack within the fork tine receiving member (30). As well, the fork tine receiving member (30) may need to define an opening (not shown) in a lowermost portion or lower surface thereof to permit the front wheel of the pallet jack to pass or extend therethrough to contact the ground surface. More particularly, the sleeve (32) may define an opening (not shown) in a lower surface or lowermost portion thereof to accommodate the wheel. Further, where the rigidifying insert (34) is comprised of a four-sided tubular member, rather than a channel-form member, the lowermost portion or bottom member (40) of the rigidifying insert (34) will also define an opening (not shown) therein, compatible with and corresponding to the opening defined by the sleeve (32), to accommodate the passage of the wheel of the pallet jack therethrough.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. In a bulk bag of the type comprising a flexible body having a bottom and a
5 sidewall, the bulk bag comprising:
 - (a) at least one pair of tubular fork tine receiving members associated with the
body and arranged in a substantially parallel spaced relationship for receiving
10 fork tines from a forklift, wherein each fork tine receiving member is
comprised of a flexible sleeve and a removable rigidifying insert positioned
therein to facilitate the receipt of the fork tines in the receiving members;
 - (b) a releasable restrainer for inhibiting the removal of the rigidifying insert from
15 the sleeve, wherein the releasable restrainer is associated with at least one of
the pair of fork tine receiving members.
2. The bulk bag as claimed in Claim 1 wherein the pair of fork tine receiving
members are associated with the bottom of the body of the bulk bag.
- 20 3. The bulk bag as claimed in Claim 2 wherein the sleeve of each fork tine
receiving member is comprised of the bottom of the body of the bulk bag.
4. The bulk bag as claimed in Claim 2 wherein the sleeve of each fork tine
25 receiving member depends from the bottom of the body of the bulk bag.
5. The bulk bag as claimed in Claim 1, 2, 3 or 4 wherein each sleeve has opposed
ends, wherein the opposed ends of the sleeve extend beyond the rigidifying insert positioned
therein and wherein the releasable restrainer is associated with each of the opposed ends to
30 inhibit the removal of the rigidifying insert from the sleeve.
6. The bulk bag as claimed in Claim 5 wherein each of the opposed ends of the
sleeve is comprised of a loop about at least a portion of a perimeter of the opposed end and
wherein the releasable restrainer is inserted within the loop.
- 35 7. The bulk bag as claimed in Claim 1, 2, 3 or 4 wherein each sleeve is
comprised of a material with sufficient elasticity to stretch to receive the rigidifying insert and
then contract to inhibit the removal of the rigidifying insert from the sleeve.

8. The bulk bag as claimed in Claim 7 wherein each sleeve is comprised of a flex plastic.

9. The bulk bag as claimed in Claim 8 wherein the flex plastic is comprised of ethylene vinyl acetate.

10. The bulk bag as claimed in Claim 7 wherein each sleeve has opposed ends and wherein the opposed ends of the sleeve extend beyond the rigidifying insert positioned therein such that the opposed ends of the sleeve elastically contract inwardly to inhibit the rigidifying insert from being removed from the sleeve.

11. The bulk bag as claimed in Claim 10 wherein the releasable restrainer is comprised of the inwardly contracted opposed ends of the sleeve.

12. The bulk bag as claimed in Claim 10 wherein the releasable restrainer is associated with each of the inwardly contracted opposed ends of the sleeve to further inhibit the removal of the rigidifying insert from the sleeve.

13. The bulk bag as claimed in Claim 12 wherein the releasable restrainer is comprised of a removable rigid retainer associated with each of the inwardly contracted opposed ends of the sleeve for precluding the stretching of the opposed ends sufficiently outwardly to permit the rigidifying insert to be removed from the sleeve.

14. The bulk bag as claimed in Claim 13 wherein the removable rigid retainer is comprised of at least one rigid member extending about at least a portion of a perimeter of each of the opposed ends of the sleeve.

15. The bulk bag as claimed in Claim 14 wherein each of the opposed ends of the sleeve is comprised of a loop about at least a portion of the perimeter of the opposed end and wherein the rigid member is insertable within the loop.

16. The bulk bag as claimed in Claim 1, 2, 3, 4, 8 or 9 wherein the releasable restrainer is comprised of at least one removable fastener for securing the rigidifying insert with the sleeve.

17. The bulk bag as claimed in Claim 16 wherein each sleeve has opposed ends defining a sleeve length therebetween.

18. The bulk bag as claimed in Claim 17 wherein the releasable restrainer is comprised of a plurality of removable fasteners for securing the rigidifying insert with the sleeve.

5 19. The bulk bag as claimed in Claim 18 wherein the sleeve defines an outer surface of the fork tine receiving member, wherein the rigidifying insert defines an inner surface of the fork tine receiving member and wherein each removable fastener extends between the outer surface and the inner surface of the fork tine receiving member.

10 20. The bulk bag as claimed in Claim 19 wherein the plurality of removable fasteners are spaced longitudinally along the sleeve length.

15 21. The bulk bag as claimed in Claim 20 wherein at least one removable fastener is comprised of a locking screw, a locking pin or a flexible tie extending between the outer surface and the inner surface of the fork tine receiving member for securing the rigidifying insert with the sleeve.

20 22. The bulk bag as claimed in Claim 21 wherein the releasable restrainer is further comprised of a reinforcing member associated with at least one removable fastener.

23. The bulk bag as claimed in Claim 22 wherein the reinforcing member is comprised of at least one reinforcing plate, wherein the removable fastener extends through the reinforcing plate to secure the reinforcing plate with the fork tine receiving member.

25 24. The bulk bag as claimed in Claim 23 wherein the reinforcing plate is secured with one of the outer surface and the inner surface of the fork tine receiving member

30 25. The bulk bag as claimed in Claim 23 wherein the reinforcing member is comprised of a pair of reinforcing plates, wherein the removable fastener extends through the reinforcing plates to secure the reinforcing plates with the fork tine receiving member and wherein one of the pair of reinforcing plates is secured with the inner surface of the fork tine receiving member and the other of the pair of reinforcing plates is secured with the outer surface of the fork tine receiving member.

35 26. The bulk bag as claimed in Claim 19 wherein the rigidifying insert extends substantially between the opposed ends of the sleeve to define opposed first and second ends of the fork tine receiving member.

27. The bulk bag as claimed in Claim 26 wherein at least one removable fastener secures the rigidifying insert with the sleeve proximate to at least one of the opposed first and second ends of the fork tine receiving member.

5 28. The bulk bag as claimed in Claim 27 wherein at least one removable fastener is comprised of a locking screw, a locking pin or a flexible tie extending between the outer surface and the inner surface of the fork tine receiving member proximate at least one of the opposed first and second ends of the fork tine receiving member.

10 29. The bulk bag as claimed in Claim 28 wherein the releasable restrainer is further comprised of a reinforcing member associated with at least one removable fastener.

30. The bulk bag as claimed in Claim 29 wherein the reinforcing member is comprised of at least one reinforcing plate, wherein each removable fastener extends through
15 the reinforcing plate to secure the reinforcing plate with the fork tine receiving member.

31. The bulk bag as claimed in Claim 30 wherein the reinforcing plate is secured with one of the outer surface and the inner surface of the fork tine receiving member

20 32. The bulk bag as claimed in Claim 30 wherein the reinforcing member is comprised of a pair of reinforcing plates, wherein each removable fastener extends through the reinforcing plates to secure the reinforcing plates with the fork tine receiving member and wherein one of the pair of reinforcing plates is secured with the inner surface of the fork tine receiving member and the other of the pair of reinforcing plates is secured with the outer
25 surface of the fork tine receiving member.

33. The bulk bag as claimed in Claim 31 wherein the reinforcing plate is comprised of a reinforcing end surface and wherein the reinforcing plate is secured with the outer surface of the fork tine receiving member such that the reinforcing end surface of the
30 reinforcing plate abuts one of the opposed ends of the fork tine receiving member.

34. The bulk bag as claimed in Claim 27 wherein at least one removable fastener is comprised of a clamp having a pair of clamping arms, wherein the clamp is positioned at one of the opposed first and second ends of the fork tine receiving member such that the inner
35 surface and the outer surface of the fork tine receiving member are secured between the clamping arms of the clamp.

35. The bulk bag as claimed in Claim 34 wherein an inner surface of at least one clamping arm is comprised of a gripping surface for enhancing the securing of the fork tine receiving member between the clamping arms.

5 36. The bulk bag as claimed in Claim 35 wherein the removable fastener is further comprised of a locking screw or a locking pin extending between the clamping arms of the clamp for further enhancing the securing of the fork tine receiving member between the clamping arms.

10 37. The bulk bag as claimed in Claim 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35 or 36 further comprising a peripheral reinforcing impact panel secured to the sidewall adjacent the bottom of the bulk bag.

15 38. The bulk bag as claimed in Claim 37 wherein the peripheral reinforcing impact panel is secured to the sidewall proximate to the tubular fork tine receiving members.

39. The bulk bag as claimed in Claim 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 or 38 further
20 comprising two pairs of tubular fork tine receiving members, wherein a first pair of tubular fork tine receiving members intersects substantially perpendicularly a second pair of tubular fork tine receiving members.

40. The bulk bag as claimed in Claim 1, 2, 3, 4, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17,
25 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36 or 38 wherein at least one of the rigidifying inserts is comprised of a tubular member.

41. The bulk bag as claimed in Claim 40 wherein the tubular member is comprised of a channel-form member.

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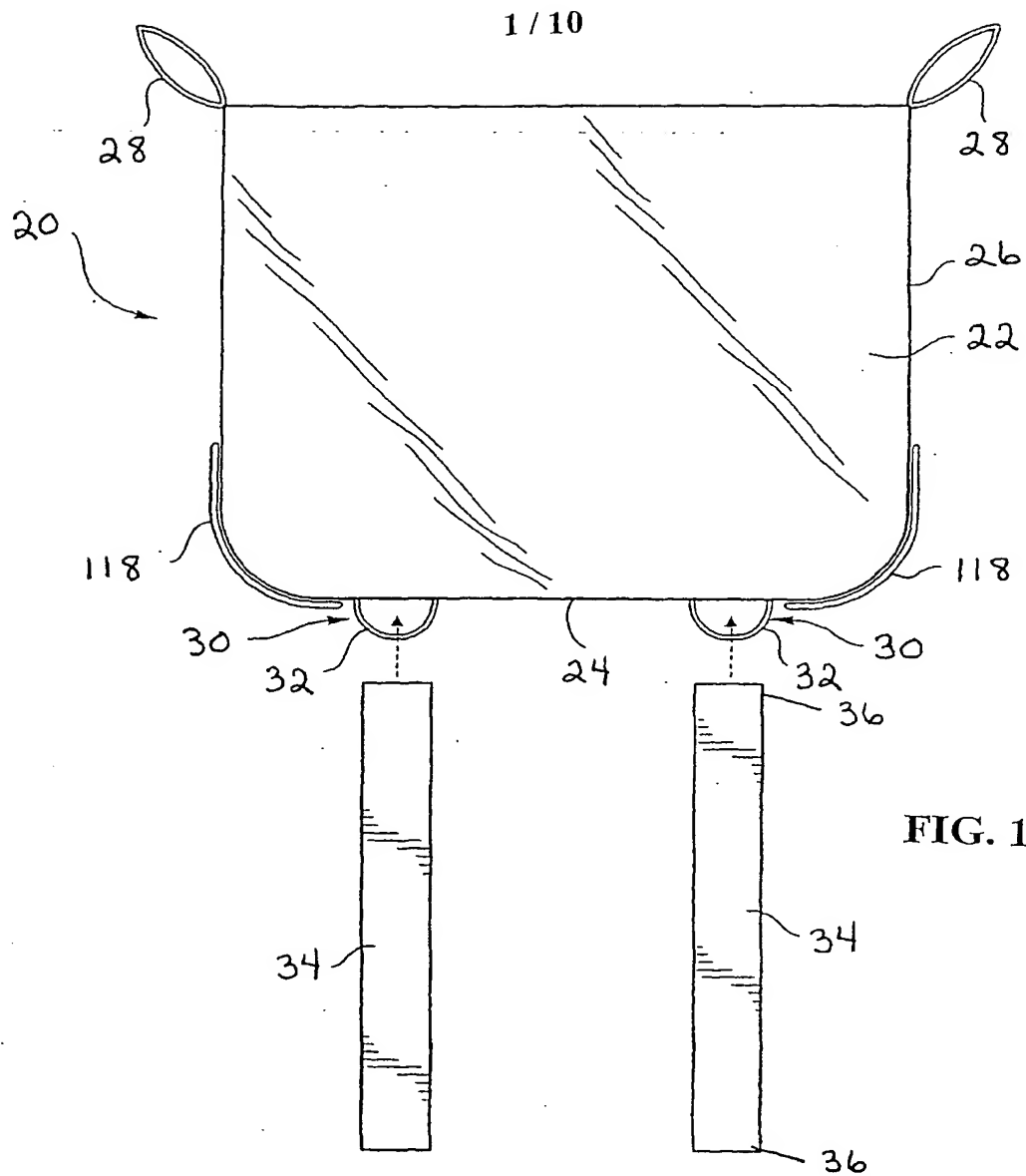
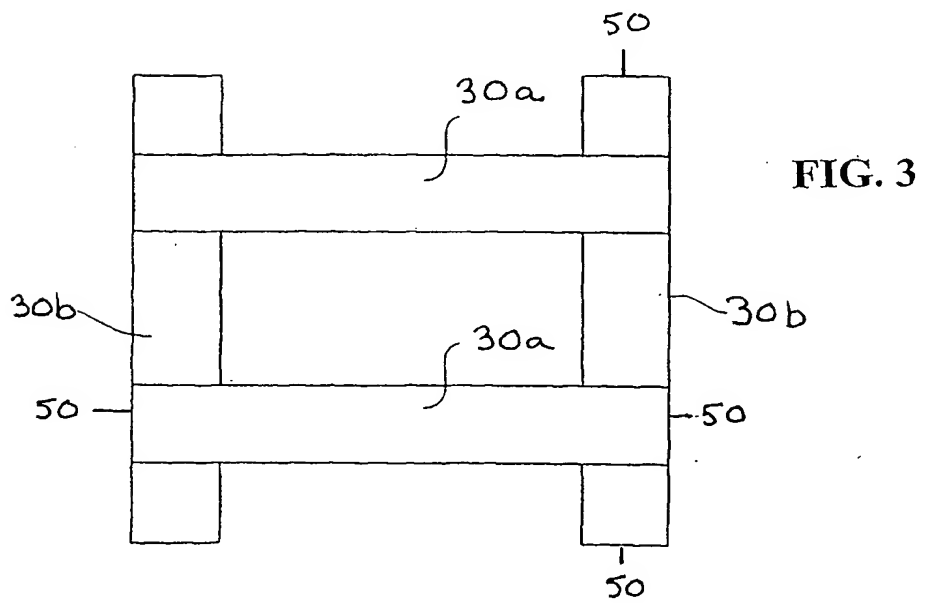
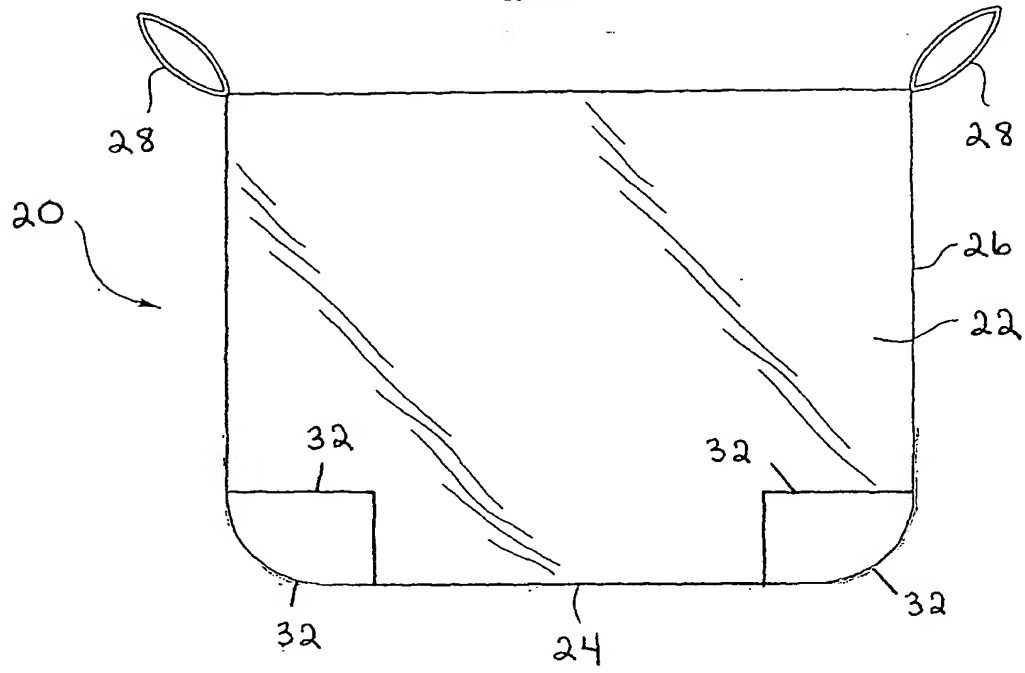


FIG. 1

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FIG. 2



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FIG. 4

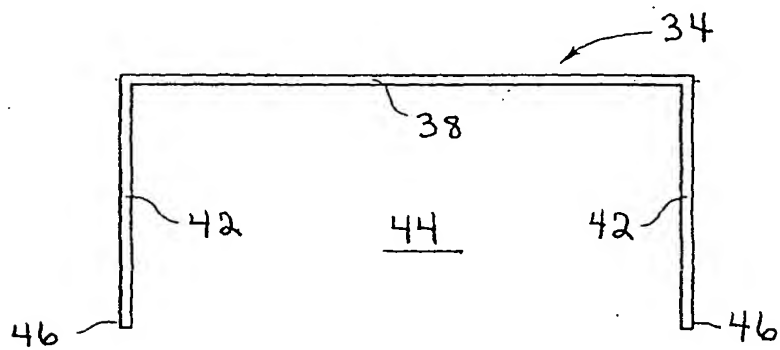
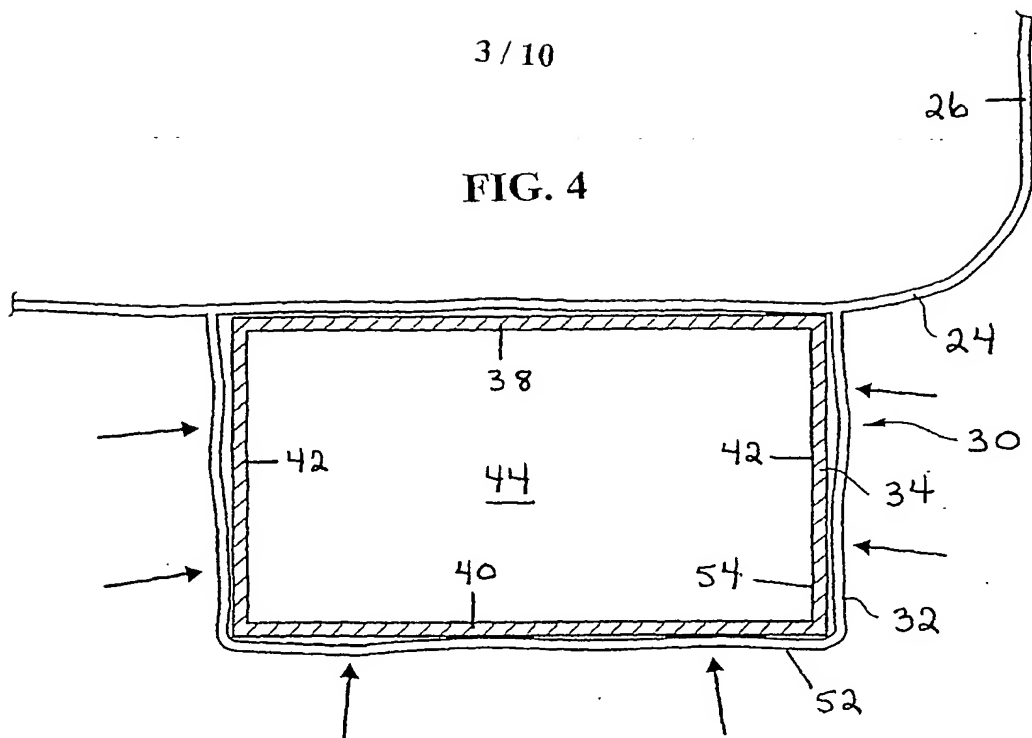
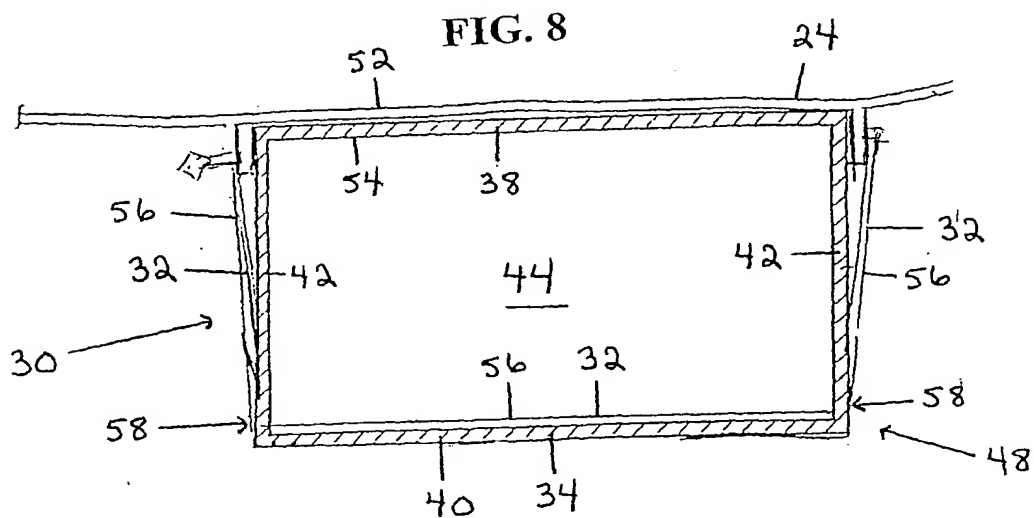
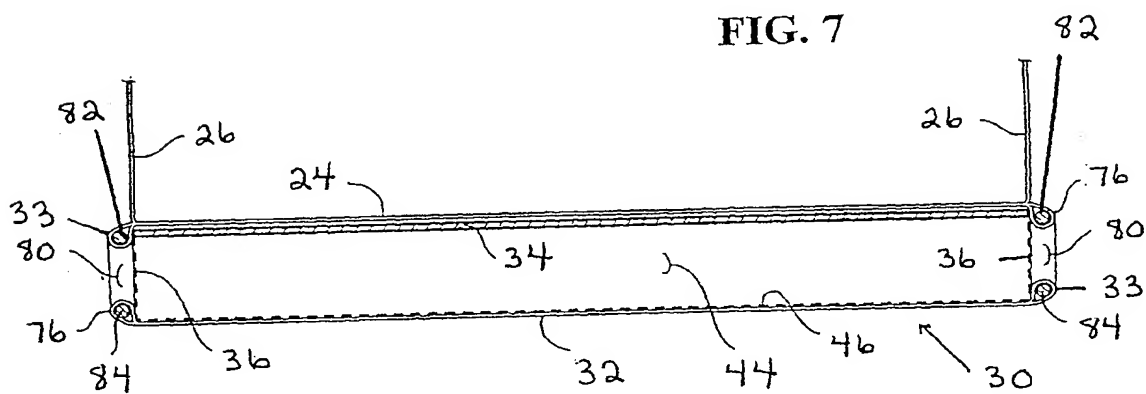
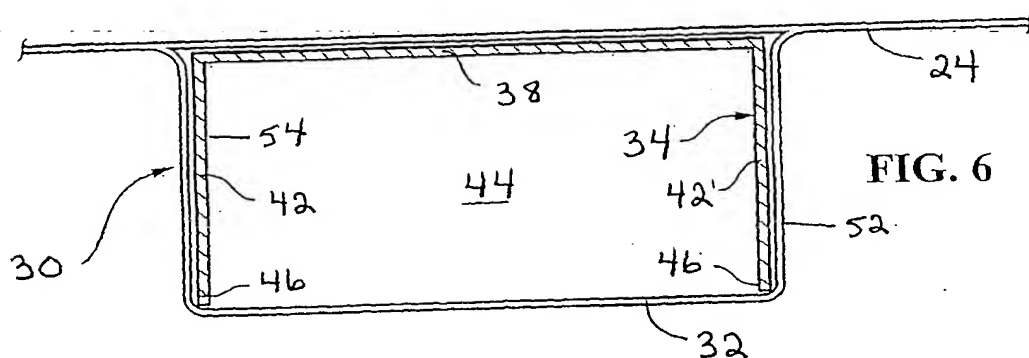
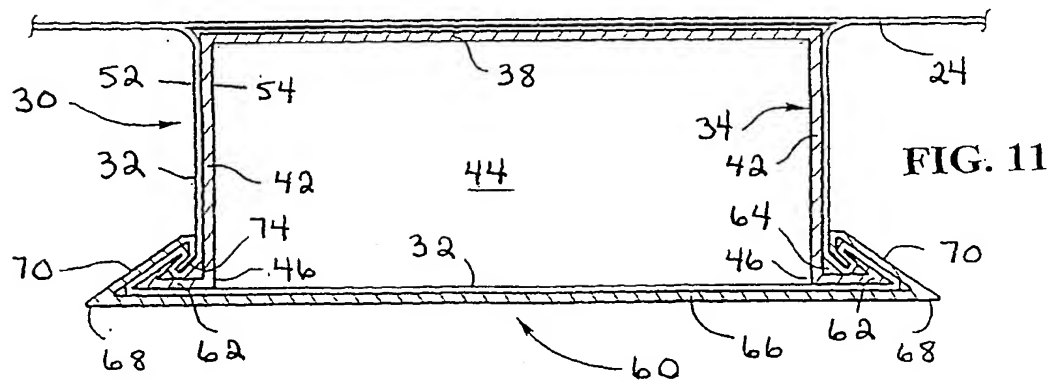
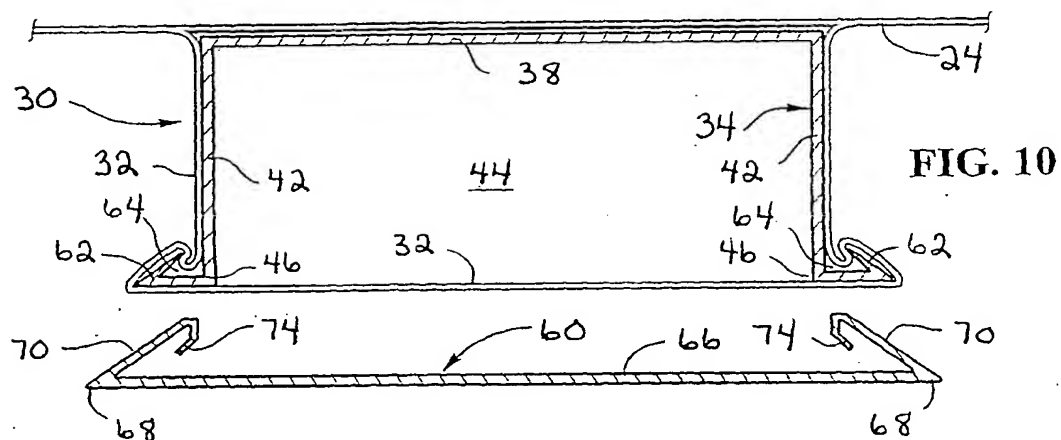
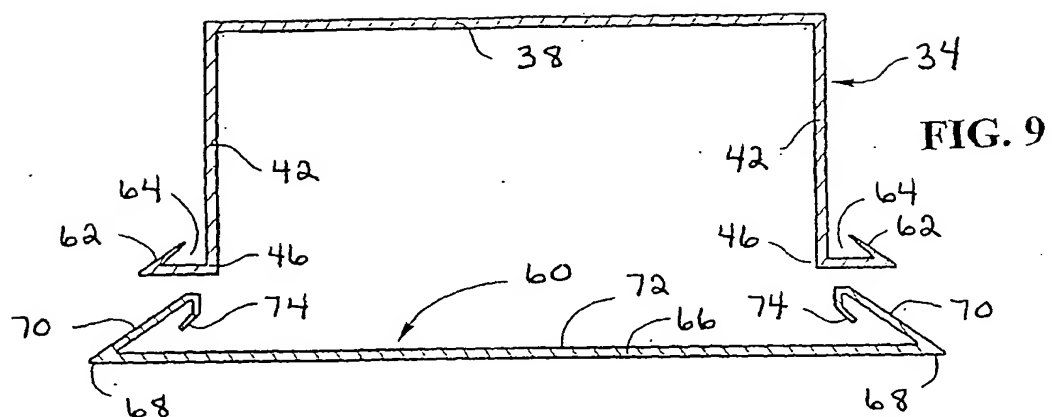


FIG. 5

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FIG. 14

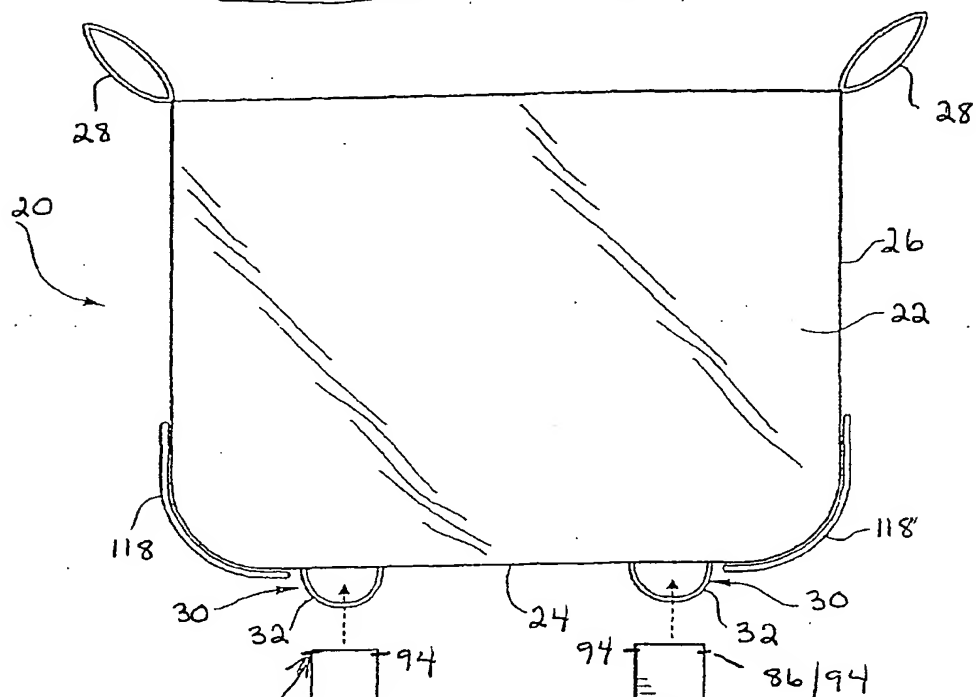
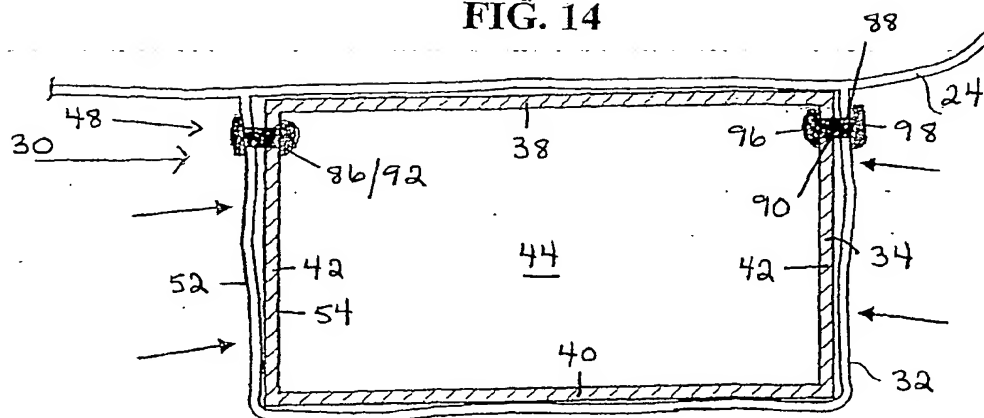
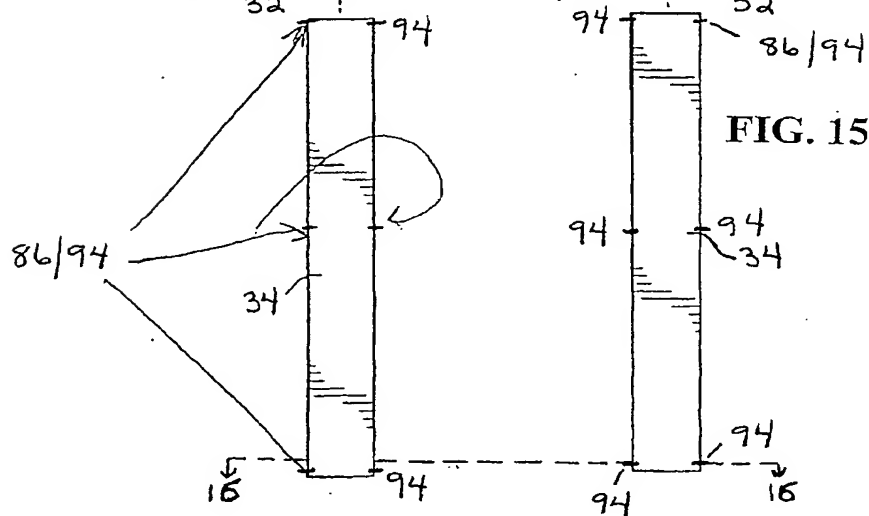


FIG. 15



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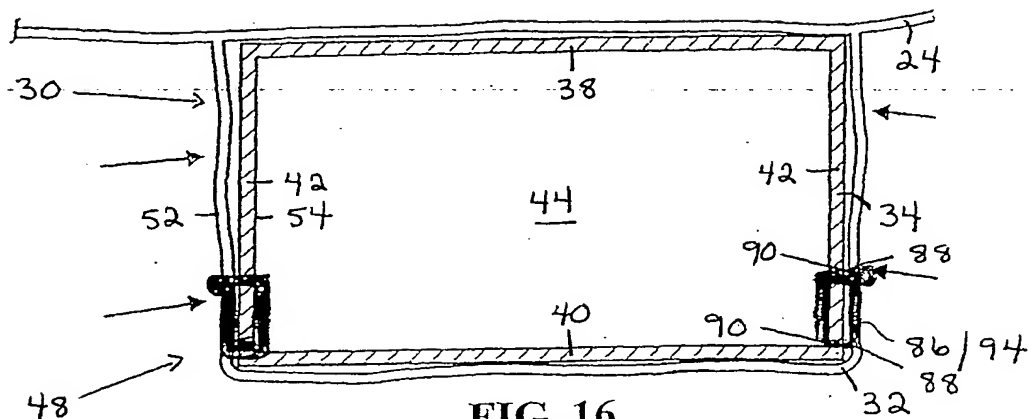


FIG. 16

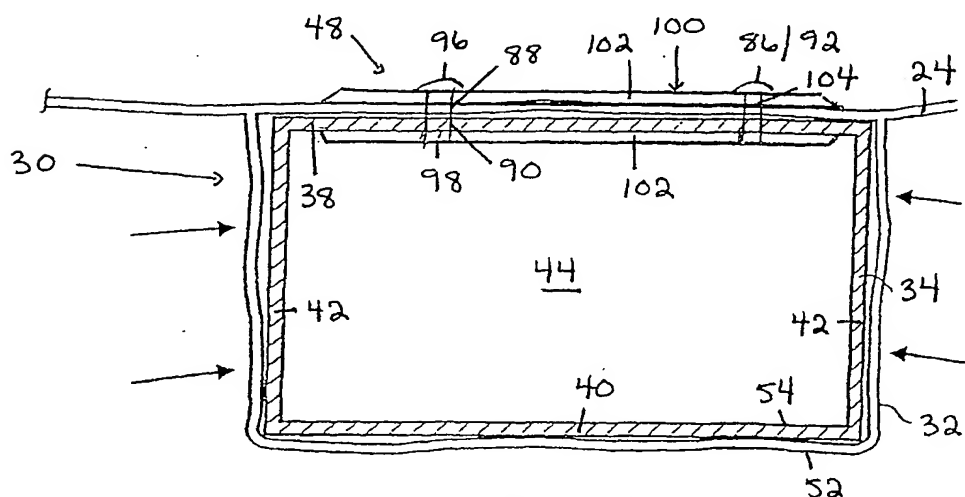


FIG. 17

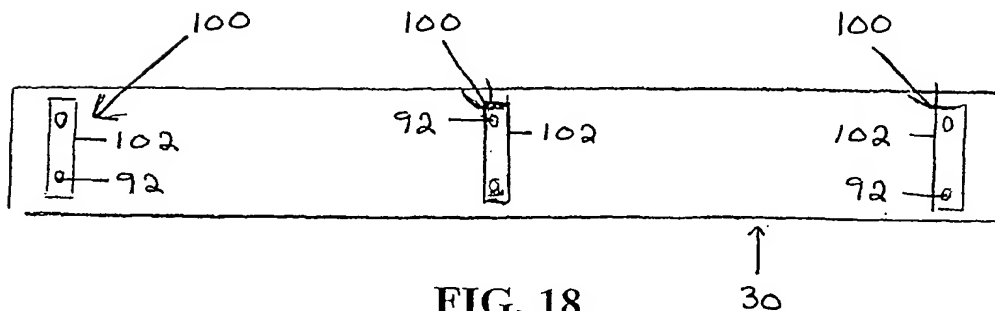
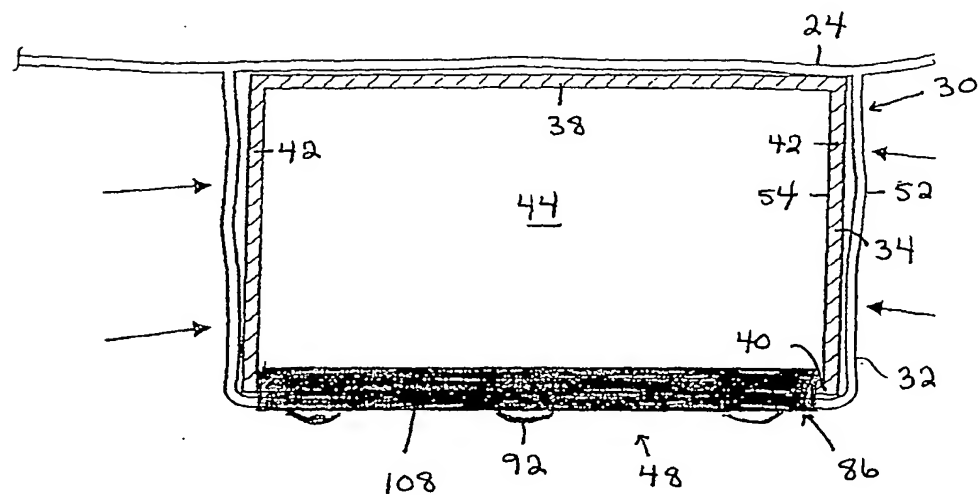
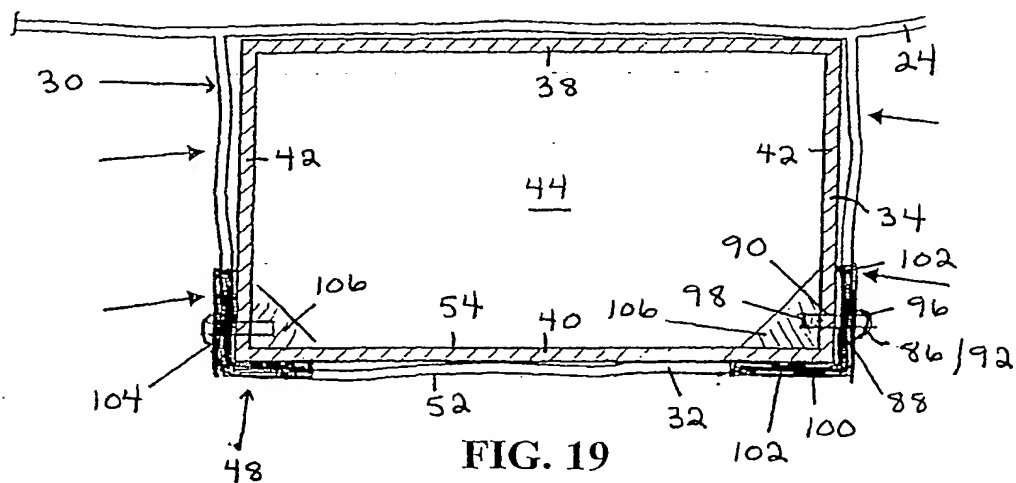


FIG. 18

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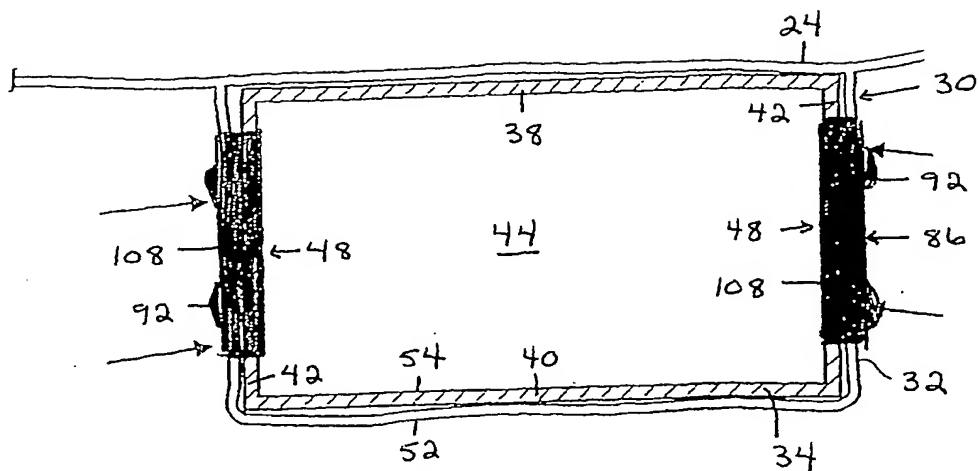


FIG. 21

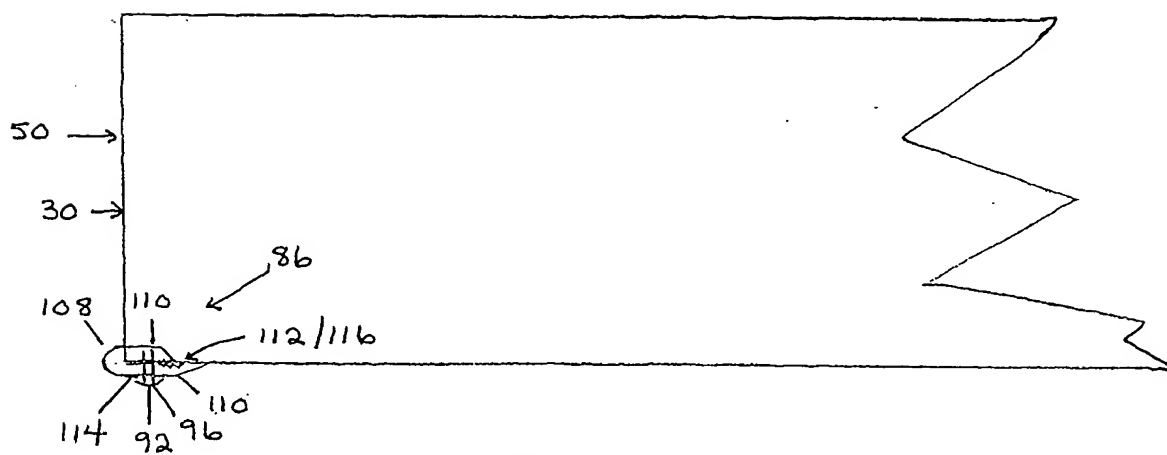


FIG. 22

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/01640

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D88/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 73174 A (INTER SALES CORP) 7 December 2000 (2000-12-07) page 4, line 14-24 page 5, line 14-21 page 7, line 1-13 claims 4,6,7,9-11 ----	1-15, 37-41
A	DE 10 92 372 B (CONTINENTAL GUMMI WERKE AG) 3 November 1960 (1960-11-03) column 4, line 4-9 -----	1

☐

Further documents are listed in the continuation of box C.

☒

Patent family members are listed in annex.

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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search

24 May 2002

Date of mailing of the international search report

24/06/2002

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA 01/01640

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